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RESPONSE OF GIMMIZAH AND MAMOURAH LOCAL STRAINS TO INDUCING FORCE MOLTING BY IODINE AND CLOMIPHENE

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ABSTRACT

Three groups of hens from each strain of Gimmizah (G) and Mamourah (M) were randomly assigned to 3 treatments. The treatments were the control, 500 PPm potassium-Iodine (P.I.) and 17 mg/kg live weight clomiphene citrate (Clom). The application of force molting treatments continued for 10 days. The G hens were significantly heavier than M ones after treatments,4,8 and 12 weeks post molting. The two strains lost nearly equal percentages of live body weight after treatments . The G hens were significantly earlier in egg laying cessation after molting than M ones. However, the M hens reached the days of first egg, 50% and peak of production post molting earlier than G ones. Similarly, M hens had significantly had better value of the laying (%) at peak of egg production and H.D.% than G ones at the intervals 0-4, 4-8, 8-12 and 0-12 week post molting. Also, M hens had significantly better values of egg mass/hen and feed conversion by 13.1 and 16.3%, respectively. The G hens had significantly better values of egg weight, egg shape index, shell weight percentage, meanwhile, the opposite was true in respect of Haugh units, yolk weight percentage and yolk index. The G hens had significantly higher values of relative live body weight of liver and ovary after molting and oviduct length at the end of experiment than M ones. Meanwhile, the opposite was true in relative live body weight of oviduct and oviduct length after treatment and ovary and oviduct at the end of experimental period where M hens had significantly higher value than G ones. The plasma total protein, globulin, cholesterol, inorganic phosphorus, GOT and GPT after treatment also, alb./glo.ratio, GOT and progesterone at the end of study were significantly higher in M hens than G ones. However, M hens was slightly higher than G ones in almost other studies plasma contents except globulin at the end of the study and alb./glo. ratio after treatment without significant differences.The hens of Clom. and P.I. groups lost 14.2 and 9.9% of live weight at the end of force molting treatments in comparison to the control. Differences in live body weight at 0,4,8 and 12 weeks post molting due to force molting treatment were significant. The force molting treatment had significant effects on the day of laying cessation, first egg, 50% and peak of egg production as well as the laying rate (%) at peak and H.D.% during the second laying cycle. The best values of H.D.% during the intervals 4-8, 8-12 and 0-12 week were recorded for the Clom. group, the egg quality traits studied varied according to force molting treatment after 10 weeks post molting. It was observed, in general, that force molting improved the quality traits than the control group. Egg mass/hen and feed conversion were significantly improved by force molting and the best values were recorded for Clom. group, however, the P.I. group ranked the second in that respect.The force molting had significant effects on internal organs studied where the control group had better values than force molted groups after treatment. However, the opposite situation was found at the end of the study. The plasma total protein, albumin, globulin, alb./glo. ratio, total calcium, cholesterol, inorganic phosphorous, GOT, GPT and progesterone concentration studied were significantly varied according to force molting method after treatment and at the end of the experiment.Generally speaking, although the two force molting treatments resulted in obviously positive results than the control, the Clom. treatment gave the best results in respect of most studied traits. So, it could be advised to use force molting by using clomiphene citrate at 17 mg/kg live body weight level as a molting procedure for 10 days to maximize the productivity of laying parent stocks of local strains.

keywords: layers, force molting, clomiphene

INTRODUCTION

Egg production is a multifactorial system. Body size, breed, environmental temperature, humidity and feed cost are some of the important factors affecting the performance of laying hens. Rate of egg production and shell quality decline with advancement of the hen age (Roland, 1979). A gradual decline in egg production with more erratic clutch cycles, a greater incidence of short clutches, increasing soft-shelled eggs, a decline in albumen quality and reduction in shell quality were found by (Ottinger, 1991). Recycling of laying hens following their first year of production by force molting is a common practice to reverse these trends and improve both of quantity and quality of egg production . in the normal molting cycle, the chicken required about four months to induce the molting and returning to lay .This procedure is not permissible in the commercial layer breeds. Therefore, force molting make it possible to speed up the molting process.

Force molting techniques are applied in commercial layers in order to stop egg production in breeding hens, for the purpose of recycling them for another cycle or to extend the economic productivity performance of breeding hens and to improve quantity and quality of egg production (Verheyen and Decuypere ,1991; Burhr and Cunningham, 1994).Force molting can be induced by various methods, such as using anti-ovulatory drugs by injection of an anti-progesterone (Adams, 1956), Oral administration anti-estrogen by chomiphen and Tamoxiphene (Mobark, 1995; Afify, 1996; Ibrahim, 1998; Ali *et al.*, 1998 and 1999 and Abd El-Aziz, 2000). Added different minerals at high level to layers diet such as iodine (Arrington *et al*.,1967 and Wilson *et al*.,1967), aluminum sulfate(Hussein *et al.,* 1989;Al-Sobayel and Al-khateeb, 1992, Ibrahim,1998 and Abd El-Aziz, 2000),Zinc (Berry and Brake, 1987; verheyen and Decuypere,1991; Awadin, 1998; Ibrahim,1998 and El-Aziz 2000). Also, many other workers were carried out by using fasting or withdrawal feed(Christmas *et al*., 1985; Douglas *et al*.,1989; Koelkebeck *et al*.,1992; Awadin, 1998; Ibrahim, 1998 and Abd El-Aziz, 2000). On the other hand, few attempts in the

research field were conducted and the Egyptian conditions using some local strains of chickens such as Mohamed *et al*; (1989), Atallah *et al*.(1989&1992); Hattaba *et al*. (1990); Abd El-Kader(1997); Awadin,(1998) and Ibrahim, (1998).

In laying hens, there is tightly relationship between the concentration of blood constituents (proteins, lipids, minerals, enzymes and hormones) and egg production status (Brake *et al*., 1981). In most cases a previous parameters as well as reproductive organs weight used as a good indicator for egg production and quality.

The obtained results of force molting in the available literature are variable. The variability may be partially due to differences in the used method and the genotype of birds (Ali *et al*. 1998). Therefore, the purpose of this study was to evaluate the feasibility effects of using potassium iodine (additive to diet at high level) and clomiphene citrate (orally administered) to induce force molting in two locally developed strains on live body weight and organs changes, egg production characteristics, egg quality traits, egg mass, feed consumption, feed conversion and blood constituents.

MATERIALS AND METHODS

The study was carried out at EL-Gimmizah Poultry Station, Animal Production Research Institute, Ministry of Agriculture from May 2000 for 5 months. Hens from two locally-improved strains of chickens, namely Gimmizah (G) and Mamourah (M) at 60 weeks of age were used in the study. Fifty-four hens from each strain having nearly equal initial live weights were randomly assigned for 3 groups. Each group included 18 birds were individually caged. The first group was considered as a control group without any treatments. The second group was force molted by supplemented potassium iodine to the diet for 10 days at 500 ppm iodine and the third group was orally administered by daily doses of Clomphene citrate as anti-estrogen preparation at 17 mg/kg live body weight for 10 days. Throughout the force molting treatment, fresh water was supplied all the time and all hens were fed *ad-libitum*. All hens were fed production layer diet industrialized in the station. The compounds (contents) and analysis of diet were indicated in Table(1). After the beginning of force molting treatments, live body weight of hens were measured individually and after the end of force molting treatments and at 4 weeks intervals post molting. The day of completely egg laying cessation, the day of returning to lay the first egg, the day of reaching 50% egg production, the day of reaching peak production were calculated during the intervals 0-4, 4-8, 8-12 and 0-12 week post molting. Egg mass/ hen as well as feed intake and conversion (kg feed/ kg egg) were calculated throughout the experimental period (0-12 weeks post force molting treatments). Two slaughter tests after molting and at the end of the study at 12 weeks post molting were carried out, where 3 hens from each treatment per strain were slaughtered to measured the weight and percent of liver, ovary and oviduct as well as the oviduct length. Blood samples were collected after the end of treatment and at the end of the study slaughtering in heparinzed tubes. Plasma was obtained by centrifuging at 3000 rpm for 15 minutes and stored at -20° until analysis by commercials kits to measure total protein, albumin, globulin, inorganic phosphorus, total calcium, cholesterol, GOT, GPT and progesterone. From each strain 30 eggs (10 from each group)were randomly chosen after 10 weeks post molting to determine the exterior and interior egg quality traits. Data were statistically analyzed by the analysis of variance using statistical software (Statgraphics, version 5 STSC, Rockville, 1991). Differences between means were detected by Duncan multiple range test (1955).

Table (1): Composition and calculated analysis of basal diet.

Ingredients	%
Yellow corn	66.00
Soybean meal, 44 %	24.10
Limestone	7.60
Dicalcium phosphate	1.60
Salt	0.30
Vit. & Min. mix.*	0.25
Methionine	0.15
Total	100
Calculated values:**	
Crude protein, %	16.697
ME,Kcal/kg	2750.83
Calcium, %	3.321
Available phosphorus, %	0.404
Lysine, %	0.817
Methionine,%	0.416

Methionine + cysteine %	0.694
Determined values*:**	
Dry matter, %	89.327
Crude protein,%	16.098
Crude fiber,%	3.376
Ether Extract,%	2.897
Ash,%	10.673

*** Vit.& Min. mix:each 3kg contains: 10,000,000 IU Vit. A; 2,000,000 IU, Vit D_3 10,000 mg Vit. E; 1,000mg Vit. B1; 5,000mg Vit. B2; 1,500mg,Vit B6; 10mg, Vit. B12; 50mg Biotin;250,000mg choline chloride; 80g manganese; 40g iron; 40g zinc; 2g copper; 2g iodine and 2g cobalt.**

**** Calculated according to NRC (1984).**

***** Determined according to the methods of A.O.A.C (1980)**

RESULTS AND DISCUSSION

Body weight changes:

Changes in body weight as affected by force molting are shown in Table (2), where it indicated that, irrespective of force molting treatment G hens were significantly heavier than M ones after treatment,4,8 and 12 weeks after

the end of force molting treatment .The two strains G and M had lost nearly equal values from life body weight (8.3 vs. 7.7 %) after treatment. After force molting inducing or application for 10 days, it was observed that the hens of Clomiphene citrate (Clom.) and Potassium Iodine (P.I.) groups lost 14.2 and 9.9 % of their live body weight in comparison to control ones (Table 2). The hens started to resume or compensate the weight loss which happened in table 2two force molting groups where the hens of the previously two force molting groups were heavier than the control one by about 1.1 and 1.7 % after 4 weeks post molting, respectively. It was observed that the hens of two groups recovered their weight loss after 4 weeks post molting and the two force molted groups of Clom. and P.I. surpassed the control group by 9.8 and 9.3% after 8 weeks post molting, and by 16.6 and 13.1% after 12 weeks post molting, respectively.

The force molting treatment had significant effects on body weight loss this was inagreement with Mobarak, (1995),who found significant reduction in body weight of Clomiphene treated birds in comparison to control and Ibrahim, (1998) and Ali *et al* .(1999) obtained that the Tamoxifen and Eltroxine treatments had significant reduction in body weight loss of hens treated for 12 days and after 4,8 and 12 weeks post molting.

The interactions strain x force molting treatment were significant at all ages studied (Table2). The response of G hens were greater than the M ones in body weight loss after 10 days treat in both of two force molting treatments. At 4,8 and 12 weeks post molting, it was generally noticed that G hens were better in respect of the recovery of weight loss than M ones in two force molting treatments. The response of some breeds of chickens to force molting treatment was similar as reported by Ghatas (1994) on Dandarawi, Mandara and Doki-4 ; Abd El-Kader (1997)on silver Montazah and Matrouh and Ibrahim (1998) on Gimmizah and Mamourah local strains.

Egg production traits and performance:

Irrespective of the force molting treatment, the response of G hens to force molting was significantly higher than that of M ones , where egg laying was ceased after the beginning of the treatment by 4.2 and 6.4 days in hens of the two strains, respectively (Table 3). On the contrary trend was obtained in the respect of the day of laying the first egg after laying cessation, where M hens were significantly faster returning to egg laying after molting than G ones (32.6 vs. 38.2 days).

The M hens were significantly earlier in reaching 50 % egg production and day of peak than G ones, where they averaged 41.5 vs. 47.4 days and 54.3 vs. 58.5 days, respectively. similarly, the laying rate at peak was significantly better in M hens than the G ones (50.4 vs. 47.1%) as show in (Table 3). The same trend was found also in all egg production intervals studied (0-4,4-8,8-12 and 0-12 weeks after force molting treatments, where M hens had significantly better laying rate values than G ones by 31.2,11.0,9.1 and 9.1% of the previously mentioned intervals, respectively. Similar strain differences in respect of days to laying cessation, days to 50% or peak of egg production and laying rate throughout the second laying cycle were reported b Atallah *et al*. (1992) on ISA brown and Fayoumi ; Ghatas (1994) on Dandarawi, Mandarah and Dokki-4. Also, similar significant breed differences

in H.D.% were reported by El-Dakroury *et al*.(1983) on silver Montazah and Gimmizah hens, Abd El Kader, (1997) on silver Montazah and Matrouh and Ibrahim, (1998)on Gimmizah and Mamourah.

The effect of force molting treatment on the day of laying cessation differed among the treatments (Table3). It was noticed that although the hens fed P.I. supplemented diet continued egg laying during treatment, the Clom. group ceased laying egg through 5.3 days and returned to lay the first egg after 35.4 days from the end treatment. Laying cessation and day of first egg after force molting by various methods (fasting, Zno supplementation and hormonal treatment was occurred with in 1-7 days as was reported by Shippee *et al*. (1979), Atallah *et al*. (1992). Abd El Kader, (1997), and Ibrahim, (1998). The hens of Clom. group were significantly the earliest in reaching 50% and peak of egg production at 39.3 and 50.5 day respectively (Table 3). The P.I. group was followed in these respects by 49.5 and 55.2 days, respectively. Similarly, the highest value of laying rate at peak was recorded for Clom. group and the lowest one was that of control group (72.0 vs. 23.9%). It was observed that force molting caused great improvement in laying rate at peak in comparison to the control group, where the force molted groups; Clom. and P.I. had values of laying rate at peak equal to 3.01 and 2.1 times that of the control group, respectively. Similar differences due to force molting method in laying rate at peak and whole second cycle were reported by Atallah *et al*. (1992) using progesterone, high zinc and fasting, Mohammed, (1994) using hormonal treatment and fasting, Abd El Kader, (1997) using high zinc, low sodium and fasting and Ibrahim, (1998) using fasting, high levels of Aluminum sulfate and Zn O, Eltroxin and Tamoxifen.

The force molting treatment significantly affected the H.D% at all intervals studied (Table 3). It was noticed that Clom. group at 0-4 week post molting had significantly less H.D% value than the control group by about 36.1%. During the intervals 4-8,8-12 and 0-12 week post molting, the two force molting groups had significantly better values of H.D% than the control. The recorded values of H.D% for Clom. and P.I. groups were 2.3 and 1.6, 2.8 and 2.2,and 1.8 and 1.5 times that of control at 4-8, 8-12 and 0-12 week post molting, respectively. The obtained results showed that the Clom. treatment resulted in the least reduction in H.D% at the first four weeks post molting and continued in the superiority thereafter at 4-8 and 8-12 week post molting. The force molting treatment had significantly improved H.D% post molting as reported by Atallah *et al*.(1992) using fasting and high ZnO methods, Mohammed, (1992) on fasting or high ZnO ,Mobarak, (1995) on Tamoxifen and Clomiphene treatments, Abd El-Kader (1997)on fasting, low Na and high ZnO and Ibrahim, (1998) on fasting, high level of aluminum and ZnO, Eltroxine and Tamoxifene treatments.

The interaction between strain and force molting treatment in respect of day of laying cessation, day of first egg were not significant. However, it was significant for the day of reaching 50% or peak egg production laying rate % at peak and H.D.% at all intervals studied. Therefore, the response of hens to the force molting treatment differed significantly between the two strains. It was better in M hens than G ones in the Clom. and P.I. groups. Abd El-Kader, (1997) obtained significant interaction between strain and force molting treatment in H.D%.

Egg mass, feed intake and conversion:

The M hens surpassed G ones significantly in respect of egg mass/ hen by about 13.1% (Table 3). At the same interval, the G hens consumed slightly more feed per day than M ones by about 2.9%. therefore, M hens showed significantly better values of feed conversion where G ones needed 16.3% more feed than M ones to produce one Kg of egg. Similarly, Ibrahim, (1998) obtained significant strain differences in egg mass, feed consumption and feed conversion in the same two strains by using other methods of force molting.

Irrespective of the strain, the force molting treatment resulted in significant improvement in egg mass /hen where the values of egg mass/hen in Clom. and P.I. groups were 1.96 and 1.5 times that of the control group, respectively. Although, the feed intake values for all groups were approximately equal, the feed conversion was significantly affected by force molting treatment which resulted from the variability in egg mass at the same interval. The force molting treatment resulted in obvious improvement of feed conversion in the force molted groups than the control one, groups of Clom. and P.I. needed 48.9 and 33.4% less feed than the control to produce one Kg of egg. Abd El-Kader, (1997) and Ibrahim, (1998) obtained none significant difference in feed intake (gm/hen/day) between treatments, however, the values of feed conversion for egg production were significantly differed between treatments when used various other methods of force molting. The response of M hens to force molting treatment was positive and significantly better in the two force molting treatments than G ones in respect of egg mass /hen and feed conversion (Table 3). The improvement in feed conversion by force molting treatments may be due to the superiority of these groups than the control in respect of egg mass/ hen at the same interval. Abd El-Kader, (1997) found significant interaction in respect of feed intake and egg mass, but, it was not significant in feed conversion however, Ibrahim, (1998) obtained no significant interactions between breed and force molting method in respect of egg mass/ hen, feed consumption and feed conversion.

Egg quality traits:

The G hens surpassed M ones significantly in respect of egg weight, egg shape index, shell weight percentage, shell thickness and albumen weight percentage by about 1.7, 1.5, 3.5, 2.9 and 0.2 %, respectively (Table 4). The opposite trend was found in the traits of Hague units, yolk weight percentage

and yolk index, where M values showed significant better by 0.9, 1.5 and 1.5% in the last three traits, respectively. It must be mentioned that although, the strains differences in that respect were statistically significant, they had no importance from the productive view of consideration (Ali *et al*. (1998 port B). Significant strain differences in egg quality traits were reported for some local strains by Ghatas, (1994), Abd El-Kader, (1997) and Ibrahim, (1998). However, Awadin, (1998) found that Gimmizah, Mamourah, and Mandarah hens did not differ in these exterior egg quality traits after molting.

The treatment of force molting affected significantly on the studied egg quality traits at 10 weeks post force molting (Table 4). It was observed that

the Clom. group had the best values in respect of egg weight, egg shape index, albumen weight percentage, Haugh units and yolk index traits. Where, the Clom. group had surpassed the control one by about 5.4, 3.5, 2.8, 2.0 and 8.9% for previous egg quality traits, respectively. In respect of the values of P.I. treatment, they were intermediate. Similarly, the force molting treatment resulted in better egg quality traits after molting as was reported by Ghatas, (1994), Awadin, (1998) and Ibrahim, (1998). However Berry and Brake, (1987), Ingram and Mather, (1988) and Soliman, (1993) found no significant effects on egg quality traits due to force molting treatment.

The interaction between strain and force molting treatment in respect of these egg quality traits were significant, where the two strains were different in their response to force molting treatment. The egg weight, egg shape index, shell weight percentage and shell thickness values were higher in G than M at 10 weeks post force molting. However, the opposite trend was found in albumen weight percentage, Haugh units yolk weight percentage and yolk index, where the M hens were superior in that respect than G ones.

Relative organ weights:

Data from the present study clearly indicated that relative weight of liver was significantly differ due to strain (Table 5). Relative liver weight was significantly higher in G hens than M ones by about 15.6% after treatment. However, the differences between the two strains in relative liver weight became insignificant at the end of the study. It was observed that relative liver weight at the end of the study increased by 15.8% in G hens and by 30.7% in M ones than their values after treatment. The better development in M hens than that occurred in G ones shown that M strain was more responded to force molting than G ones, which may be due to their better egg production. These results were in agreement with that reported by Ibrahim, (1998) who obtained that relative liver weight significantly varied among strains after treatment, while at the end experiment the force molting treatment had significantly negative effect on liver weight percentage after treatment where all hens force molted by two treatments had significantly less values than the control group (Table 5).

In comparison to the control group the hens of the Clom. And P.I. groups lost 33.3 and 21.4% of their liver weight percentages, respectively. On the other hand, at the end of the study (12 weeks after treatment), although there were significant differences between the two treatments of molting in favor of Clom. treatment in relative liver weight, both treatments increased liver percent as equal as control (Table 5). It was clearly observed that within each treatment of force molting, M hens had lower values than G ones in relative liver weight after treatment, and at the end of the study. The lower relative liver weight during the forced molt was due to the absence of estrogen which dependent synthesis of phospholipoprotins and other lipids by liver (Muller, 1976). Hattaba *et al* (1990) found that the internal organs were negatively affected by force molting. Similarly, Ibrahim, (1998) reported that table4 table5relative liver weight were 8.7 and 13.4 % less the control by using Eltroxin and Tamoxifen (anti-estrogen drugs) methods, respectively.

After treatment, the interaction between strain and force molting was significant, where G strain had significantly higher relative liver weight than M

strain under the two treatments of molting. Meanwhile, this interaction was insignificant at the end of the study. Similar to that observed in the liver, it could be mentioned that relative ovary, weight significantly higher in G hens than M ones by about 16% after treatment.

On conversely, M hens recorded a significantly higher oviduct relative weight (2.39 %) than G ones (2.21%). The differences between the two strains became not significant at the end of the experimental period for relative ovary weight. Meanwhile, oviduct relative weight appeared significant difference between the two strains after treatment and at the end of the experimental period. Similar results were obtained by Ibrahim, (1998).

As shown in Table 5, the treatment of force molting had significant effects on relative ovary oviduct weights. After treatment, the relative ovary weight was reduced by 39.1 and 35.2% in hens of Clom. and P.I. groups in comparison to the control group, respectively. Meanwhile, the relative oviduct weight was reduced by 38 and 32% of the pervious two treatments in comparison the control after molting, respectively. Opposite results were obtained at the end of the experimental period, where relative ovary and oviduct weights significantly increased by the two treatments and became higher than unmolted control hens by 17.4 and 7.97% for relative ovary weight and by 22.1 and 11.0% for relative oviduct weight in Clom. and P.I. groups, respectively. The reduction in the relative ovary and oviduct weights after

molting was due to the absence of estrogen as indicated by reduced relative weights of these organs (Brake *et al*.,1981). Molt was apparently caused by Clom. and P.I. induced ovarian regression and this regression provided and signal for a molt to begin. The nature of the signal is unknown, but it may be mediated by thyroid hormones, also ovarian regression is common to all techniques used to induce molt and improve the rate of lay (Dikerman and Bahr, 1989). The Clom. molted birds lost considerably more relative ovary and oviduct weights after treatment, while showed a marked improvent in egg production (as shown in Table 3) over than P.I. molted birds. Concerning the interaction between strain and force molting treatment, it could be noticed that, relative ovary and oviduct weights of hens treated with Clom. dropped sharply after treatments in the two strains G and M comparison with their controls. At the end of the experimental period, ovary and oviduct percentages were significantly higher in all molted groups than unmolted once (Table 5). The highest percentages of ovary and oviduct weight were exhibited by M strain under Clom. treatment. The data of Table 5 indicated that there were no significant differences in respect of oviduct lengths between the two strains of G and M after treatment. However, the differences in oviduct length were significantly due to strain at the end of study. After treatment and at the end of experimental period, the oviduct length results appeared significant differences between treatments (Table 5). They had less values by 35.3 and 29.2% in oviduct length, respectively. Similarly, Mobarak, (1995) obtained significant reduction in oviduct length after treatment by Tamoxifen and Clomiphene, where it decreased to be 62.7 and 74.9%that of control, respectively. The opposite situation was found at the end of the experimental period, where oviduct of the same force molting groups were longer than the control by 46.5 and 19.8%, respectively. The noticeable observation was that, although the average of oviduct length loss was slightly greater in Clom. Group than in P.I and control groups. The great development of oviduct length was logic, since the morphology and histology of the oviduct were tightly depend up on the physiological status of the reproductive system (Ali *et al*., 1998). Similarly, Ibrahim, (1998) reported that oviduct length of the force molting groups Tamoxifen and Clomiphene were greatly developed at the end of the experimental period to become 2.34 and 2.95 times their values after force molting treatments, respectively.

No interaction was observed between the treatment of molt and strain of hen for oviduct length after treatment. In contrast to the last period, oviduct length recorded highly significant difference between molting treatment. G strain exhibited the longest oviduct length on Clom. molting treatment (being 74.00 cm). This result confirmed the useful rate of Clom. molting treatment in improving the reproduction organs after molt which reflected on egg production and egg quality. The results of this study concerning ovary and oviduct weight were completely in agreement with those obtained by Badawy *et al*. (1986) who revealed that the reproduction tract weight of Clom. treated animals were higher than control. Also, these results were closely in agreement with those obtained by Dikerman and Bahr, 1989 and Ibrahim, 1998. They reported a great fitness in reproductive organs as a result of using hormonal molting methods. The reproductive organs fitness reflected by the increase in egg production.

Blood constituents:

The results of plasma proteins constituents are shown in Table 6. It is obviously clear that M strain had the highly significant concentrations of plasma total protein and globulin after treatment. Their values were 6.87 and 4.59 g/dl for M hens versus 6.4 and 4.12g/dl for G ones, respectively. the quantity of plasma albumen and Alb./Glo. ratio showed no essential difference in relation to strain after treatment. The significant variations that occurred in the previous parameters due to strain were found to be disappeared at the end of the experimental period except for Alb./Glo. ratio which was significantly higher (53.87%) for G hens than M ones (49.62%). These results were nearly in agreement with those reported by Ibrahim (1998) when he used different methods of force molting in G and M strains. The relation between blood proteins concentration and egg production rate probably results from a completely specific (adaptive) function of the mechanism regulating the exchange of protein, hence should be designed as a property characteristic for good layer (Rako *et al*., 1964). In regard to the effect of force molting method after treatment period, it could be noticed a significant lower in the concentration of plasma total protein, albumen and globulin for hens molted by Clom. and P.I. treatments as compared with the control group (Table 6). the Clom. treatment caused the greatest amount of reduction in the previous parameters. The total protein concentration values averaged 5.88 , 6.40 and 7.62 g/dl for Clom., P.I. and control groups. the corresponding values for albumen were 1.99 , 2.05 and 2.79 g/dl and they were 3.89 , 4.35 and 4.86 g/dl for globulin for the three treatment groups, respectively. Also. Alb./Glo. ratio was found to be significantly lower by the

treatment of P.I. while, the difference in its ratio between Clom. treatment and control was not significant. In contrary, at the end of experimental period, the hens which molted by Clom. treatment had highest concentration values of plasma total protein, albumen, globulin and Alb./Glo. ratio, Meanwhile, those molted by P.I. treatment had the lowest values of the previous parameters. On the other hand, there were no significant differences could be observed in the values of albumin, globulin and Alb./Glo. ratio between the two treatments of molting at this period, except for the plasma total protein which was significantly lower for P.I. group than each of Clom. and control groups.

The results of the Table 6, indicated that there was a highly significant interaction between strain of hen and the treatment of force molting. Hens of both strains which molted by Clom. treatment had the lowest concentration of plasma total protein, albumen and globulin after treatment. Opposite results were obtained at the end of experimental period, where Clom. treatment had the highest values of plasma total protein, albumen, globulin and Alb./Glo. ratio, meanwhile, P.I. treatment had the lowest values of previous parameters in both strains.

In general, the profile of plasma proteins at the two period studied agreed with the previous reports of Ibrahim, (1998) who used a hormonal force molting methods (Eltroxin and Tamoxifen) in local strains. It is interesting to note that, the decrease and increase in plasma proteins concentration in this study may be correlated with the production in status of the birds, their levels decreased during force molting period and increased with the increasing of egg production rates during the post-molting period. The depression in plasma protein levels which happened after treatments of force molting may be due to the absence of estrogen. The rate of egg production after treatments of force molting could be indicative of the action of estrogen on the liver function. Estrogen may allow the liver to more efficiently produce elevated levels of plasma protein when hen resumed egg production again after force molting period. The present results suggested that the increase in plasma protein levels during the high production period may be due to the increase in estrogen level during that period which increased protein levels of the blood as shown in Table 6.

After the end of force molting treatment, the level of plasma total calcium remained at the same level in both strains (Table 7). On the other hand, plasma inorganic phosphorus and cholesterol values for M hens were significantly higher than G ones by about 11.9 and 8.5%for the two previous traits, respectively. At the end of experimental period, the differences in plasma total calcium, phosphorus and cholesterol values were not significant due to the strain of hen. Similarly, Ibrahim, (1998) reported insignificant differences between breeds when he used various methods of force molting in local strains.

Comparing the effect of force molting treatment on plasma total calcium, inorganic phosphorus and cholesterol values, data presented in Table 7 indicated that, plasma concentrations of total calcium, inorganic phosphorus and cholesterol for the birds molted by Clom. and P.I. treatments were significantly lower than that of control group after treatment. At the end of experimental period, plasma total calcium, inorganic phosphorus and
cholesterol levels were significantly increased for Clom. treatments over the control group. The Clom. molting treatment was more effective in increase the previous parameters as compared with P.I. treatment. These observations were similar to those of Ibrahim, (1998).

The results of Table 7 revealed that there was a significantly interaction between strain and force molting method after treatment. M strain molted by P.I. treatment had the highest plasma total calcium, meanwhile the same strain showed the highest plasma inorganic phosphorus and cholesterol levels when they molted by Clom. treatment during that period. On the other hand, there was no significant interaction between strain and force molting treatment could be detected for the previous parameters at the end of experimental period.

The obvious observation in this respect that the values of plasma total calcium, inorganic phosphorus and cholesterol pronouncedly increased with retrieve of the egg production after molting period, this may be attributed to the effect of the increase in estrogen secretion during that period which increase calcium and phosphorus release in blood stream. Also estrogen played an important rate in cholesterol biosynthesis in the liver. Hence, the absence of estrogen decreased levels of serum cholesterol during the forced molt (Brake *et al.*, 1981). Similar results were obtained by several workers (Brake and Thaxon, 1979a; Brake *et al*., 1981 and Ibrahim, 1998).

With respect to the effect of strain on plasma GOT and GPT enzymes activity, it was noted from Table 7, that M hens had significantly higher plasma GOT and GPT concentrations by about 2.56 and 5.99% than G ones after treatment period, respectively. At the end of the experimental period, the difference in GOT between strains was significant in favor of M strain, while this difference was not significant for GPT during that period. The results indicated that M hens plasma GOT and GPT were more than those of G ones in the two studied periods. Ibrahim, (1998) reported that the differences between strains were significant in GOT but not significant for GPT at the three intervals studied. Regardless the strain, the results in Table 7, showed that there was an inverse relationship between GOT and GPT under the different force molting methods. In case of GOT activity after force molting treatments, it could be observed that activity (concentration) significantly increased by using Clom. and P.I. force molting treatments over than control group. There was a significant difference between the two molting treatments each other and the control. Conversely to GOT, the GPT activity was found to be lowered than control when different force molting treatments were used. But the trend of GPT activity due to force molting treatments remained constant between treatments during the two periods studied. It could be observed that there were significant interaction between strain and the force molting treatment (Table7).table7

The highest GOT values were achieved by M strain under Clom. method after treatments, while the same strain recorded the highest values for GOT under the P.I. method at the end of the experimental period.

It is interesting to note that, the inverse relationship between GOT and GPT activity was obviously cleared with time of egg production. Plasma GOT content was found to be increased during non-laying period (after treatment) and decreased after that, while GPT was found to be reduced during non-laying and increased during the laying period (at the end of experiment). The cause of this inverse relationship between the two enzymes was unknown, but it may be necessary for restarting and continuous of egg production after force molting period. Our results are closely in agreement with those reported by Ibrahim, (1998) who used Eltroxin and Tamoxifen as a force molting procedures.

The results of force molting treatments on plasma progesterone levels were found in Table 7. It could be noticed that, while no significant difference was observed between M and G laying strains in plasma progesterone level after force molting treatment, there was a highly significant difference between the two strains in plasma progesterone level in favor of M hens. They surpassed G ones by about 1.32 times in plasma progesterone concentration at the end of the experiment.

Plasma progesterone levels seemed to be significantly affected by the treatment of force molting at the two studied periods (Table 7). The plasma progesterone levels were significantly lowered in both of Clom. And P.I. treatments group than the unmolted group after force molting treatment. Although the Clom. force-molted hens had the lowest level of plasma progesterone, the difference between the two treatments of molting was not significant during that period.

In contrary, at the end of experimental period, hens molted by Clom. treatments showed a highly significant increased in their plasma progesterone levels as compared with P.I. molting hens and control ones. The rate of increment in the hormone levels were about 80.4 and 62.7% for the hens molted by Clom. and P.I. treatments over the control group at the end of experimental period. Similar results were obtained by Afify (1996) who reported that plasma progesterone level for Clom. treated hens was significantly higher than control untreated hens.

A significant interaction between strain and the force-molting treatment could be detected from Table 7. The highest reduction in plasma progesterone level after force molting treatments was recorded in G hens molted by Clom. treatment, meanwhile the hormone concentration remained the same in plasma of M ones under the both treatments of molting during that period. On the other hand, M hens achieved the highest increased in plasma progesterone concentration under the both treatments of molting at the end of experimental period.

Finally, it could be concluded that, by using Clomiphene citrate at 17 mg/kg level as a force molting procedure for 10 days in local strains can be helpful in reducing the time out of lay and increasing egg production throughout improving the reproductive organs and activating the liver functions, also it can be improved the quality of egg produced. It is interesting to mention that Clomiphene citrate is relatively inexpensive drug and does not show any accumulative residues in the meat or egg as reported by Afify, (1996).

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استجابة سلالتى الجميزة والمعمورة المحليتين لإجراء الألش الإجبارى باستخدام اليود والكلوميفين

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استخدمت فى هذه الدراسة ثلاث مجموعات من كل من سلالتى الجميزة والمعمورة وخصصت كل مجموعة لمعاملة من معاملات الألش الإجبارى التالية : ١- مجموعة المقارنة (الكنترول) . ٢- مجموعة يوديد البوتاسيوم بمعدل ٥٠٠ جزء/ مليون فى العليقة. ٣- مجموعة سترات الكلوميفين بمعدل ١٧ مللى جرام / كجم وزن حى واستمرت معاملات الألش الإجبارى لمدة عشر أيام لدراسة تأثير طريقة الألش الإجبارى على بعض صفات إنتاج البض – جودة البيض – الأعضاء الداخلية للذبيحة وبعض مكونات الدم وكانت أهم النتائج المتحصل عليها ما يلى :-

- كانت دجاجات الجميزة أثقل معنويا من دجاجات المعمورة بعد الألش بفترة صفر ، ٤ ، ٨ ، ١٢ أسبوع وكانت نسبة الفقد فى الوزن بعد انتهاء المعاملة فى السلالتين متساوى تقريبا .
- كانت دجاجات الجميزة مبكرة معنويا فى التوقف عن الوضع بعد الألش عن دجاجات المعمورة – فى حين أن الأخيرة كانت مبكرة فى العودة لوضع أول بيضة والوصول مبكرة إلى ٥٠ % إنتاج وقمة إنتاج البيض بعد الألش عن دجاجات الجميزة وبالمثل فقد كانت المعمورة أعلى معنويا فى قيم معدل الإنتاج عند قمة الإنتاج ومعدل الإنتاج خلال دورة الإنتاج الثانية (صفر – ٤ ، ٤ – ٨ ، ٨- ١٢ ، صفر – ١٢ أسبوع) بعد الألش عن مثيلتها فى دجاجات الجميزة . وأيضا كانت دجاجات المعمورة الأفضل معنويا من حيث كتلة البيض / دجاجة ومعدل التحويل الغذائى بحوالى ١٣,١ ، ١٦,٣% على التوالى .
- كانت دجاجات الجميزة أعلى معنويا عن دجاجات المعمورة فى وزن البيضة ، دليل شكل البيضة ، النسبة المئوية لوزن القشرة ، سمك القشرة وكذلك النسبة المئوية لوزن البياض فى حين كان العكس قد تحقق فى Haugh units ، النسبة المئوية لوزن الصفار ودليل الصفار .
- كانت دجاجات الجميزة أعلى معنويا عن المعمورة فى قيم النسبة المئوية لوزن الكبد والمبيض بعد المعاملات وطول قناة البيض عن نهاية فترة الدراسة فى حين كان العكس من ذلك فى النسبة المئوية لوزن قناة البيض بعد المعاملات والمبيض وقناة البيض عند نهاية الفترة التجريبية .
- كان محتوى بلازما الدم من البروتين الكلى ، الجلوبيولين ، الكولسترول ، الفوسفور الغير عضوى وأنزيمات GPT,GOT بعد المعاملات وكذلك النسبة المئوية الألبيومين/ الجلوبيولين ,GOT والبروجسترون عند نهاية التجربة أعلى معنويا فى دجاجات المعمورة عن دجاجات الجميزة .
- كانت النسبة المئوية للفقد فى وزن الجسم فى معاملات الألش الإجبارى بالكلوميفين ويوديد البوتاسيوم ١٤,٢ ، ٩,٩ % من الوزن الحى عند نهاية المعاملة مقارنة بمجموعة الكنترول وكانت الاختلافات فى وزن الجسم عند فترات صفر ، ٤ ، ٨ ، ١٢ أسبوع بعد الألش الإجبارى والراجعة إلى معاملات الألش معنوية .
- كان لطريقة الألش الإجبارى تأثيرات معنوية على أيام حدوث التوقف عن الوضع ، أول بيضة ، ٥٠ % إنتاج بيض قمة إنتاج البيض بالإضافة إلى النسبة المئوية لمعدل إنتاج البيض خلال دورة الإنتاج الثانية . وكانت أحسن قيم لمعدل الإنتاج (H.D.%) خلال فترات ٤- ٨ ، ٨-١٢ ، صفر-١٢ أسبوع بعد الألش قد سجلت بواسطة معاملة الكلوميفين .
- تنوعت صفات جودة البيض المدروسة تبعا لطريقة الألش الإجبارى حيث نلاحظ عموما أن معاملات الألش الإجبارى حسنت صفات جودة البيض عن مجموعة الكنترول . وأيضا تحسنت كتلة البيض/ دجاجة ومعامل التحويل الغذائى بواسطة الألش الإجبارى حيث كانت أحسن القيم بواسطة معاملة الكلوميفين بينما كانت معاملة يوديد البوتاسيوم فى الترتيب الثانى لهذه الصفة .
- كان للألش الإجبارى تأثيرات معنوية على النسبة المئوية لوزن الأعضاء الداخلية المدروسة حيث كانت مجموعة الكنترول أحسن من المجموعات المعاملة خلال فترة ما بعد انتهاء المعاملات مباشرة فى حين كان العكس من ذلك موجودا عند نهاية الدراسة.
- مكونات البلازما من البروتين الكلى ، الألبيومين ، جلوبيولين ، النسبة المئوية الألبيومين/ جلوبيولين ، الكالسيوم الكلى ، الكلسترول ، الفوسفور الغير عضوى ، أنزيمات GPT,GOT و البروجسترون اختلفت معنويا تبعا لطريقة الألش الإجبارى بعد المعاملات مباشرة وعند نهاية فترة الدراسة .

عموما ، على الرغم من أن كل من طريقتي الألش الإجبارى أعطت النتائج الإيجابية السابقة مقارنة بمجموعة الكنترول ، إلا أن طريقة لألش الإجبارى باستخدام سترات الكلوميفين أعطت أحسن النتائج فيما يتعلق بمعظم الصفات المدروسة . ولهذا فإننا ننصح بإجراء الألش الإجبارى باستخدام هذه الطريقة كأجراء للحصول على أقصى استفادة إنتاجية لقطعان الأمهات البياضة من السلالات المحلية .

Table 2 : Changes in live body weight as affected by force molting in Gimmizah and Mamourah local strains.

Traits	Treatment	Control			Potassium Iodine			Clomiphene Citrate			Overall mean			SE
		G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	
After Treatment		a 1717.3	a 1716.0	1716.6	b 1607.4	c 1547.3	1577.4	c 1512.4	d 1608.6	1462.1	a* 1612.4	b* 1558.3	1585.4	17.83
Loss	Weight (g)	15.30	11.80	C 13.60	b 179.9	c 158.7	B 169.3	a 263.6	ab 224.3	A 243.9	142.7	131.5	137.1	
	Change w/c%	+0.9	+0.7	+0.8	-10.48	-9.25	-9.9	-15.4	-13.1	-14.2	-8.3	-7.7	-8.0	7.35
L.W. After 4weeks	Weight (g)	a 1808.7	b 1761.9	A 1785.3	ab 1772.7	c 1719.0	AB 1754.9	b 1755.8	c 1716.0	B 1735.9	a* 1779.1	b* 1732.3	1755.7	
	Change w/c%	5.3	2.7	4.0	3.2	0.2	1.7	2.2	0.0	1.1	3.6	0.9	2.3	18.301
L.W. After 8weeks	Weight (g)	ab 1927.3	c 1838.7	AB 1883.0	B 1924.3	c 1828.7	B 1876.5	a 1954.7	c 1815.0	A 1884.9	a* 1935.4	b* 1827.5	1881.5	
	Change w/c%	12.2	7.2	9.7	12.1	6.6	9.3	13.8	5.8	9.8	12.7	6.5	9.6	17.528
L.W. After 12weeks	Weight (g)	a 2114.7	b 2014.0	A 2064.3	b 2004.0	c 1878.7	B 1941.4	ab 2064.3	c 1935.3	AB 2001.3	a* 2062.0	b* 1942.7	2002.4	
	Change w/c%	23.1	17.4	20.3	16.7	9.5	13.1	20.4	12.8	16.6	20.1	13.2	16.6	16.93

.a,b Means within row having similar small letter(s) are not significantly different at P> 0.05.
A,B Means within row for each age having different capital letter(s) are significantly different at P> 0.01.
a*, b* Means within row for each trait having different small letter(s) are significantly different at P> 0.01.

Table 3 : Means and standard errors of day of laying cessation, first egg, 50% production, peak of egg production, laying rate (%), hen-day egg production percentage (H.D.%), egg mass (g/hen), feed intake (g/hen/day) and feed conversion (g feed/g egg) post force molting for Gimmizah and Mamourah local strains.

Treatments / Traits	Control (C)			Potassium Iodine (P)			Clomiphene Citrate(CL)			Overall mean			SE
	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	
Day of cessation	---	---	---	---	---	---	4.2	6.4	5.3	b 4.2	a 6.4	5.3	0.18
Day of first egg	---	---	---	---	---	---	38.2	32.6	35.4	a 38.2	a 32.6	35.4	1.117
Day of 50% egg production	---	---	---	a 52.6	b 46.4	A 49.5	b 42.1	c 36.5	B 39.3b	a* 47.4	b* 41.5	44.5	2.315
Day of peak production	a 65.9	b 61.3	A 63.6	b 58.1	c 52.3	B 55.2	c 51.5	d 49.4	C 50.5	a* 58.5	b* 54.3	56.4	2.608
Laying rate % at peak egg production	e 22.3	e 25.5	C 23.9	d 49.3	c 51.3	B 50.3	b 69.6	a .74.4	A 72.0	b* 47.1	a* 50.4	48.7	2.103
Hen-Day (%) (0-4 weeks)	e 21.40	a 31.18	A 26.29	c 22.14	b 27.61	B 24.8	d 15.46	c 18.11	B 16.79	b* 19.67	a* 25.63	22.65	0.269
Hen-Day (%) (4-8 weeks)	e 21.18	d 28.57	C 24.88	d 37.14	c 40.0	B 38.57	b 55.46	a 58.93	A 57.19	b* 37.93	a* 42.5	40.22	0.488
Hen-Day (%) (8-12 weeks)	e 18.79	de 27.61	C 23.2	d 49.04	c 50.96	B 50.00	b 64.29	a 66.82	A 66.56	b* 44.04	a* 48.46	4625	0.575
Hen-Day (%) (0-12 weeks)	e 20.48	d 29.13	C 24.80	c 3611	b 39.52	B 37.81	b 45.08	a 47.95	A 46.51	b* 33.89	a* 38.87	36.38	2.055
Egg mass (g) /hen	e 955.1	d 1226.7	C 1110.9	d 1591.6	c 1749.8	B 1670.7	b 2104.4	a 2243.86	A 2174.1	b* 1550.37	a* 1753.45	1651.91	57.92
Feed intake (g)/ hen / day	a 107.98	b 104.44	106.21	a 108.27	b 104.51	106.39	a 107.00	b 105.23	106.12	b* 107.75	a* 104.73	106.24	0.494
Feed conversion, feed (g) / egg (g)	a 9.50	b 6.93	A 8.03	c 5.71	d 5.02	B 5.35	d 4.27	e 3.94	C 4.10	a* 5.84	b* 5.02	5.43	0.279

a,b,c Means within the same row with different superscripts letter are significantly different.
A,B Means within each row within each trait with different superscripts letter are significantly different.
a*, b* Means within row for each trait having different small letter(s) are significantly different at P> 0.01.

Table 4:Means and standard errors of egg quality traits as affected by force molting(after 10 weeks post force molting) in Gimmizah and Mamourah local strains.

a,b,c Means within the same row with different superscripts letter are significantly different.
A,B Means within each row within each trait with different superscripts letter are significantly different.
a*, b* Means within row for each trait having different small letter(s) are significantly different at P> 0.01.

Traits \ Treatments	Control (C)			Potassium Iodine (P)			Clomiphene Citrate(CL)			Overall mean			SE
	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	
Egg Weight (g)	c 52.89	c 52.87	B 52.88	ab 55.58	b 54.84	AB 55.21	a 56.68	b 54.68	A 55.67	a* 55.05	b* 54.13	54.59	0.309
Egg Shape index	bc 0.743	c 0.737	B 0.740	b 0.751	bc 0.746	AB 0.749	a 0.776	b 0.756	A 0.766	a* 0.757	b* 0.746	0.752	0.004
Shell Weight (%)	a 12.2	a 12.2	A 12.2	ab 11.7	c 11.0	B 11.4	ab 11.7	b 11.3	AB 11.5	a* 11.9	b* 11.5	11.7	0.007
Shell Thickness(mm)	a 32.4	b 31.2	A 31.8	ab 31.8	bc 30.4	AB 31.1	bc 30.9	bc 30.9	B 30.9	a* 31.7	b* 30.8	31.3	0.114
Albumen weight (%)	bc 54.6	c 53.9	B 54.3	b 54.9	ab 55.3	AB 55.1	ab 55.7	a 55.9	A 55.8	a* 55.1	b* 55.0	55.1	0.272
Haugh Units	c 79.1	c 79.2	B 79.1	b 80.1	ab 81.0	AB 80.6	b 80.1	a 81.2	A 80.7	b* 79.8	a* 80.5	80.2	0.474
Yolk weight (%)	ab 33.2	ab 33.9	AB 33.5	a 33.4	b 33.7	AB 33.5	c 32.6	bc 32.8	B 32.7	b* 33.0	a* 33.5	33.2	0.003
Yolk index	c 0.379	b 0.386	B 0.382	C 0.381	b 0.398	AB 0.389	ab 0.415	a 0.416	A 0.416	b* 0.392	a* 0.398	0.395	0.009

Table 5 : Means and standard errors of relative live weight percentage of liver, ovary, oviduct and oviduct length as affected by force molting in Gimmizah and Mamourah local strains.

Traits	Treatment	Control			Potassium Iodine			Clomiphene Citrate			Overall mean			SE
		G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	
Liver R.L.W . (%)	After Treatment	a 2.71	ab 2.33	A 2.52	b 2.03	c 1.93	B 1.98	c 1.87	d 1.49	C 1.68	a* 2.20	b* 1.92	2.06	0.114
	At the end of study	2.47	2.57	AB 2.52	2.43	2.27	B 2.35	2.80	2.73	A 2.77	2.57	2.51	2.54	0.009
Ovary R.L.W. (%)	After Treatment	a 2.53	ab 2.13	A 2.33	b 1.61	cd 1.41	B 1.51	bc 1.51	d 1.33	B 1.42	a* 1.88	b* 1.62	1.75	0.195
	At the end of study	2.72	2.80	B 2.76	3.03	2.95	AB 2.98	3.15	3.33	A 3.24	2.97	3.03	3.00	0.006
Oviduct R.L.W. (%)	After Treatment	ab 2.93	a 3.07	A 3.00	c 1.93	b 2.15	B 2.04	d 1.77	bc 1.95	C 1.86	b* 2.21	a* 2.39	2.30	0.208
	At the end of study	c 2.73	ab 2.89	B 2.81	b 3.01	ab 3.23	AB 3.12	ab 3.23	a 3.63	A 3.43	b* 2.99	a* 3.25	3.12	0.171
Oviduct length (cm)	After Treatment	42.33	44.33	A 43.33	28.76	32.67	B 30.67	26.67	29.33	B 28.00	32.56	35.44	34.00	3.324
	At the end of study	cd 49.00	d 47.00	c 48.00	b 63.00	c 52.00	B 57.50	a 74.00	b 66.67	A 70.34	a* 62.00	b* 55.22	68.61	4.397

.a,b Means within row having similar small letter(s) are not significantly different at P> 0.05.
A,B Means within row for each age having different capital letter(s) are significantly different at P> 0.01.
a*, b* Means within row for each trait having different small letter(s) are significantly different at P> 0.01.
R. L. W. % = relative live weight percentage .

Table 6 : Means and standard errors of on plasma total protein, Albumen, Globulin and Albumen /globulin **(Albu./ glob) ratio after treatment and at the end of study as affected by force molting in Gimmizah and Mamourah local strains.**

Traits	Treatment	Control			Potassium Iodine			Clomiphene Citrate			Overall mean			SE
		G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	
T.prot (g/dl)	After Treatments	a 7.42	a 7.82	A 7.62	b 6.12	ab 6.68	B 6.40	c 5.65	b 6.11	C 5.88	b* 6.40	a* 6.87	6.64	0.299
	At the end of study	b 7.30	c 6.91	B 7.11	c 6.57	b 7.13	C 6.85	ab 8.03	a 8.33	A 8.18	7.30	7.46	7.38	0.204
Albu. (g/dl)	After Treatments	a 2.77	a 2.74	A 2.76	b 2.01	bc 2.09	B 2.05	c 1.96	b 2.02	C 1.99	2.25	2.28	2.27	0.163
	At the end of study	bc 2.19	ab 2.35	AB 2.27	c 1.78	c 1.99	B 1.89	b 2.28	a 2.46	A 2.37	2.08	2.27	2.18	0.177
Glob. (g/dl)	After Treatments	ab 4.65	a 5.08	A 4.86	ba 4.11	b 4.59	B 4.35	c 3.69	bc 4.09	C 3.89	b* 4.12	a* 4.59	4.36	0.239
	At the end of study	b 5.11	c 4.56	B 4.84	c 4.79	b 5.14	AB 4.96	ab 5.75	5.87	A 5.81	5.22	5.19	5.21	0.158
Alb/glo ratio %	After Treatments	a 59.57	ab 53.94	A 56.76	bc 48.91	c 45.53	B 47.22	b 53.12	bc 49.39	AB 51.26	53.87	49.62	51.75	0.105
	At the end of study	ab 42.86	a 51.54	A 47.20	c 37.16	bc 38.72	B 37.94	bc 39.65	b 41.91	AB 40.78	b* 39.85	a* 43.74	41.79	0.005

.a,b Means within row having similar small letter(s) are not significantly different at P> 0.05.
A,B Means within row for each age having different capital letter(s) are significantly different at P> 0.01.
a*, b* Means within row for each trait having different small letter(s) are significantly different at P> 0.01.

Table 7 : Means and standard errors of on plasma Calcium, Cholesterol, Inorganic Phosphorus, GOT, GPT, and Progesterone after treatment and at the end of study as affected by force molting in Gimmizah and Mamourah local strains.

Traits	Treatment	Control			Potassium Iodine			Clomiphene Citrate			Overall mean			S
		G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	G.	M	Aver.	
Calcium (g/dl)	After Treatments	ab 25.56	a 26.12	A 25.84	bc 17.84	b 18.03	AB 17.93	c 14.08	bc 15.35	B 14.71	19.16	19.83	19.50	1.1
	At the end of study	24.72	25.14	C 24.93	32.63	39.53	B 36.08	42.89	47.77	A 45.28	33.38	37.48	35.43	1.1
In. phos (g/dl)	After Treatments	ab 8.45	a 9.18	A 8.82	c 6.06	b 6.70	AB 6.38	c 5.83	b 6.75	B 6.29	b* 6.78	a* 7.54	7.16	7.1
	At the end of study	7.85	8.73	B 8.29	8.64	9.86	AB 9.25	9.95	10.89	A 10.42	8.81	9.83	9.32	8.4
Cholesterol (g/dl)	After Treatments	ab 163.14	a 182.24	A 172.69	d 126.35	c 131.40	B 128.88	c 135.83	bc 147.53	B 141.68	b* 141.77	a* 153.77	174.75	0.4
	At the end of study	127.59	132.18	C 129.89	130.82	139.76	B 135.29	144.05	156.02	A 150.04	134.15	142.65	138.40	0.6
GOT (U/l)	After Treatments	c 299.17	bc 309.07	C 304.12	b 315.23	ab 231.47	B 318.45	ab 328.47	a 336.52	A 332.50	b* 314.29	a* 322.35	318.32	6.0
	At the end of study	ab 310.57	a 317.90	A 314.24	bc 240.57	b 258.10	B 249.34	c 210.93	c 220.80	B 215.87	b* 254.02	a* 274.60	264.31	12.5
GPT (U/l)	After Treatments	ab 158.40	a 164.63	A 161.52	c 121.77	bc 129.23	B 125.50	c 113.50	bc 123.38	B 118.44	b* 131.22	a* 139.08	135.15	5.9
	At the end of study	ab 170.50	a 180.03	A 175.27	b 151.80	c 138.60	B 145.20	bc 142.73	bc 149.96	B 146.35	155.01	156.20	155.60	6.3
Progesterone	After Treatments	b 0.123	a 0.132	A 0.128	c 0.009	d 0.007	B 0.008	e 0.006	d 0.007	B 0.0065	0.046	0.049	0.048	0.0 9
	At the end of study	d 0.193	cd 0.215	B 0.204	c 0.278	ab 0.386	B 0.332	bc 0.309	a 0.427	A 0.368	b* 0.260	a* 0.343	0.302	0.0

.a,b Means within columns having similar small letter(s) are not significantly different at P> 0.05.
A,B Means within row for each age having different capital letter(s) are significantly different at P> 0.01.
a*, b* Means within row for each trait having different small letter(s) are significantly different at P> 0.01.

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