EFFECT OF RESERPINE DRUG ON PERFORMANCE OF LAYING JAPANESE QUAIL REARED WITH TWO DENSITIES UNDER HOT CLIMATE

By

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Abstract: *An experiment employing a factorial arrangement of three levels of reserpine and two densities were carried out with 270 laying Japanese quail through the experimental period (7 to 22 weeks of age). Reserpine levels were maintained at 0.0 (Control), 0.5 and 1.0 ppm / kg of diet. Two housing densities were used 3 birds (7.5 Cm^2/ bird) vs. 4 birds (5.6 Cm^2/ bird) per cage. Birds were randomly divided into three treatment groups, each group were divided into two densities each in three replicates. Basal diets were formulated according to recommended requirements of NRC (1994). Diets and water were supplied ad libitum along the experimental time. The experimental lasted 108 days after start. Temperature and humidity 35^{O}C and 65% respectively along the experimental period.*

Results obtained could be summarized as follows:

1- *Final body weight; egg production, egg weight, egg mass, egg characteristics, fertility and hatchability percentage significantly ($P \leq 0.05$) increased with increasing of reserpine level. While feed conversion and mortality rate significantly ($P \leq 0.05$) decreased as the level of reserpine increased. Feed intake was not significantly affected.*
2- *Significant ($P \leq 0.05$) interaction were noted in final weight; egg production, egg weight; egg mass, feed conversion and mortality rate percentage.*
3- *Rectal body temperature, respiration rate, heart rate; total plasma protein, albumin and total lipids were significantly ($P<0.05$) decreased as reserpine level increased. While plasma globulin recorded the reverse trend. Plasma triglyceride was not significantly affected by increasing reserpine level in diets.*
4- *Insignificant differences were observed of density effect on egg quality traits or physiological and haematological parameters of laying Japanese quail.*

INTRODUCTION

It is well known that heat stress and density of birds affect on performance of poultry species. Increasing environmental temperature and birds density decrease egg production as well as other economically important parameters. Recently, tranquilizer can be used to lowering the stress resulting from the increase of environmental temperature and density of birds. However, few studies have been made to investigate the effect of tranquilizer in poultry ration on performance of laying Japanese quail in hot climate.

Kondre *et al.,* (1964) found that the beneficial effect of tranquilizer in chickens has been indicated by decreasing mortality, increasing egg production, egg weight and improved egg quality during heat stress. However, Huston (1959) indicated that addition of pure reserpine at levels between 0.1 and 2.0 ppm stimulated growth, increased weight gain and improved feed conversion. Strukie (1959) reported that reserpine in diets of White Leghorn capons and adult females decreased heart rate. Furthermore, Darwish (1967) found that tranquilizer in poultry ration acts on saving of food intake.

Carew *et al.,* (1976) indicated that increasing the number of hens per cage reduced egg production of laying chickens. They added that the mortality rate increased at the higher hen densities. Abdel-Hakim *et al.,* (1987) indicated that feed efficiency of Hubbard chicks improved when fed on a diet containing 0.25ppm reserpine as compared with the control group. Also mortality rate decreased in group fed 0.25 and 0.5ppm of reserpine compared with control group. Balog and Hester (1989) fed layer breeders on 0.05 % Aspirin as tranquilizer for 4 weeks. They noted that Aspirin reduced production of shell less eggs, but had no effect on soft shelled eggs. Also, Daghir (1995) found that feed additives such as tranquilizers reduced the harmful effects of high temperature stress. Smith and Reynard (1992) reported that heart rate was decreased by addition of reserpine in the pigeon diets. Also, Sabry (1998) found that tranquilizers decreased pulse rate, rectal temperature and mortality rate of broiler chickens under heat stress conditions.

Concerning the effect of density on performance, Deaton *et al.* (1970) showed that high density of birds increased mortality rate. Kicak and Kamar (1977) showed that high density was very harmful to growing chicks. Supplementation of tranquilizer (0.5 and 1.0 ppm) in diets under different densities improved body weight, feed efficiency and decreased mortality rate.

This study aimed to investigate the effect of reserpine levels on laying performance and some haematological and physiological traits of Japanese quail reared under two densities at high ambient temperature (35ºC).

MATERIALS AND METHODS

The present study was conducted at the poultry experimental station, Department of Animal Production, Faculty of Agriculture, Al-Azhar University, Cairo, Egypt. During the summer season, from 30^{th} of June until 15^{th} of October 2004 (108 days). A total number of 270 Japanese quail were randomly divided into three experimental groups each group was divided into two densities each in three replicates including 15 birds each. All three experimental groups and their replicates were housed in batteries under two densities 3 (7.5Cm^2/ birds) vs. 4 birds (5.6 Cm^2/ birds) per cage. The birds were exposed to 35°C ambient temperature along the experiment, which was extended to 108 days from the start. The birds were given rations (Table 1) which were formulated according to NRC recommended requirements by (1994). The ration was supplemented with 0.0 (Control) 0.5 and 1.0 ppm reserpine (Methyl reserpate 3, 4, 5 trimethoxy benzoic acid ester (C_{33} H_{40} H_2O_9).

Initial body weight, feed consumption, egg production, egg weight, feed conversion and mortality rate were recorded. Values of egg production represent the average per treatment for the whole experimental period studied while egg mass (Kg) were calculated by multiplying number eggs in their weight.

Egg quality traits including external and internal components were determined and observations of egg quality traits were made on all collected eggs from each group in the same day (fresh laid egg). Specific gravity was measured by using saline solution which ranged from 1.062 to 1.102 by increments of 0.004 as reported by Hamilton (1982). Afterwards, eggs were weighed and broken for separating egg shell and yolk. The egg albumin was determined by differences. Yolk index was calculated as height / diameter, measuring its height by using tripod micrometer reading to the nearest of 0.01 C.C. Yolk diameter was measured by Veriner Calliper to the nearest mm. Shell thickness was measured by using micrometer, No 433-25 M.M., made by L.S. Starret Co. Athol, Mass., U.S.A. to nearest of 0.1mm. Egg shape index (S.I) was estimated as the ratio between maximum width of the eggs and length of the egg. Measurements were taken with a Vernier Calliper to the nearest of mm. Hanafi (1981) used the following equation, S.I= width / length. Egg shell breaking strength was determined with a universal testing instrument by the technique described Reece and Lott (1976).

Physiological parameters such as rectal body temperature, respiration rate and heart rate were recorded two times weekly during the experiment. Also, at the end of experimental period blood samples were collected from 6 birds of each density to determine some haematological parameters. Plasma sample was submitted for determinations of total plasma protein, albumin, lipids and plasma triglyceride by using commercial kits manufacturing by El-Nasr pharmaceutical chemical company, code No: T17 – 891 (50t). Globulin was determined by difference (total plasma protein – plasma albumin). At the end of study fertility (number of fertile eggs/total egg set x 100) and hatchability (number of hatched chicks/ total egg set x 100) of eggs were done to detect the effect of reserpine levels and density on both traits. Eggs apparently infertile or (clear) were broken out and microscopically examined.

Statistical analysis was computed using the General Linear Model for analysis of Variance described in the SAS program (SAS Institute 1990). Means of significant differences were compared using Duncans Multiple range test (Duncan 1955). The following model was used:

YiJk	= μ + αi + BJ + (α B)iJ + eiJk
YiJk	= Any observation
μ	= Overall mean.
αi	= The effect of reserpine levels (I =1,2,....... a)
BJ	= The effect of density (J= 1,2........ b)
(α B)iJ	= The interaction between reserpine and density.
α iJk	= Experimental error (K= 1, 2........ r)
A	= Treatment
B	= Density

RESULS AND DISCUSSION

Laying Performance:

Results of the effect of reserpine as well as housing density of Japanese quail on laying performance are illustrated in Table (2). Results indicated that initial body weight (7weeks old) did not differed significantly among the treatment groups, indicating the complete randomization of distribution of birds into the experimental groups. Results presented in the same table show that final body weight at the end of experiment were significantly ($P \leq 0.05$) higher for quail groups fed diets containing 0.5 and 1.0 ppm reserpine in both housing densities tested. On the other hand, it was observed (Table 2) that housing density did not released significant effect on final weight regardless of reserpine level. Significant ($P \leq 0.05$) interactions were also noted in final body weight. These results are in agreement with those reported by Kicka (1973) showed that addition of reserpine at 0.5 and 1.0ppm to the diets of Fayoumi chicks reared under high temperature (90F^o) caused improvement of body weight. Abdel-Wahed (1990) showed that live body weight and gain for broiler and Fayoumi chickens improved by addition of reserpine drug in the diets. On the other hand, Allen and Wong (1993) found that fed White Leghorn chicken on diet containing diazepam had no significant effect on body weight.

Results of Table (2) revealed that neither level of reserpine nor housing density had no significantly ($P \leq 0.05$) effect on daily feed intake (g / bird /d) and insignificant interaction was observed. These results are in accordance with those obtained by Darwish (1967) found that addition of tranquilizer acting to saving food intake.

It is also observed form Table (2) that average number of eggs laid per hen significantly ($P \leq 0.05$) increased with reserpine level increased, these findings are in agreement with those obtained by Kondre *et al.,* (1964) who found that tranquilizer increased egg production of laying chickens. Total egg percentage laid per bird significantly ($P \leq 0.05$) decreases with housing density (73.68% for housing density 4 birds/cage and 76.28% for housing density 3 birds/cage). These results indicated that increasing housing density of Japanese quail decreased egg laying which due to crowding and competition for space and feed. Significant ($P \leq 0.05$) interaction were also noted in egg production as shown in Table (2). These results are in accordance with those reported by Grover *et al.,* (1972) who indicated that egg production declines as hen density in cage increased. Also, Carew *et al.,* (1976) found that increasing the number of hens per cage reduced egg production of chickens.

Average of egg weight (g) showed incorporation of reserpine at levels of 0.5 or 1.0 ppm in laying Japanese quail diets where it significantly ($P \leq 0.05$) increased at both tested densities compared to the control group Table (2). However, average of egg weight as affected with housing density did not significantly differed among two housing densities studied. These results are agree with the findings of Kondre *et al.,* (1964) who showed that the beneficial effect of tranquilizer in chickens has been indicated by increasing egg weight during heat stress. While, Carew *et al.,* (1976) reported that hen density did not significantly affect on egg weight of chickens.

Egg mass (kg) significantly ($P \leq 0.05$) increased with each housing density tested with reserpine incorporation in diets of laying Japanese quail compared to control group. On the other hand, housing density revealed that birds reared under density of 3 birds per cage produced higher egg mass than those reared under high density of 4 birds per cage.

Average of feed conversion ratio (FCR) as Kg of diet required for production of one Kg eggs Table (2) show that incorporation of reserpine in laying quail diet significantly ($P \leq 0.05$) improved FCR which was more pronounced at the highest level i.e. 1.0 ppm. These results are in accordance with those reported by Huston (1959) indicated that addition of reserpine at levels of 0.5 and 1.0 ppm, in the diet of Fayoumi growing chicks reared under heat stress (90F^{o}) caused improvement in feed efficiency. Furthermore, Abdel-Hakim, *et al.,* (1987) indicated that a level of 0.25ppm reserpine improved feed efficiency of chickens. On the other hand Gardiner and Hunt (1984) found that reserpine decreased food efficiency of chickens.

The results showed that housing density significantly ($P \leq 0.05$) improved FCR with decreasing housing density from 4 to 3 birds per cage. These results confirm with those reported by Kicka and Kamar (1977) found that the average feed efficiency was greater in chickens reared under low density (3.9: 1) on the other hand, Proudfoot and Hulan (1985) indicated that feed conversion was not significantly affected by increase broiler chickens density.

Average of mortality rate (%) during the whole experimental period as affected with reserpine level and housing density from 3 to 4 birds per cage significantly ($P \leq 0.05$) increased mortality rate which may due to competition and aggression resulted form bird crowding. These results agreed with those of Gardiner and Hunt (1984) reported that reserpine reduced mortality rate due to sudden death syndrome in chickens. Also, Abdel-Wahed (1990) reported that adding 0.25 or 0.5ppm of reserpine for broiler chickens diet decreased mortality rate during the whole experimental period. While Proudfoot and Hulan (1985) indicated that mortality rate was not significantly affected by the increasing of birds density.

Egg quality:

Average of egg weight Table (3) as affected with reserpine drug improved significantly ($P \leq 0.05$) with each housing density tested with reserpine incorporation in the diets of laying Japanese quail compared to control group. These results are matching completely with the results of egg mass presented in Table (2). These results may reflect the importance of reserpine incorporation in laying quail diets especially in hot weather conditions. These results are in accordance with those reported by Kondre *et al.,* (1964) who showed that the beneficial effect of tranquilizer in chickens has been indicated by increasing egg weight during heat stress. On the other hand, housing density released no significant effect on egg weight Table (3), Also, these results are agree with those reported by Carew *et al.,* (1976) noted that hen density did not significantly affect on egg weight of chickens.

It is also evident from Table (3) that average of egg specific gravity significantly ($P \leq 0.05$) improved with reserpine incorporation in both housing densities studied, however housing densities seemed to have no significant effect on this trait. Average of egg specific gravity showed the same trend as egg weight which reflects a correlation between both traits. Concerning albumen weight (g) neither reserpine levels tested nor housing density seemed to have insignificant effects on this trait (Table 3).

Results of yolk weight (g), shell weight (g), shell thickness (mmx100) indicated clearly that incorporation of reserpine at 0.5 and 1.0 ppm/ kg diet level significantly ($P \leq 0.05$) improved the above mentioned traits with each housing density tested, however housing density seemed to has insignificant effect on these traits Table (3). Results of the same table show that shell breaking strength (kg / cm^2) significantly ($P \leq 0.05$) improved (increased) with each increase in reserpine level fed within both stocking densities tested compared to the control group, however housing density of birds had insignificant effect on shell strength.

In general to egg shape index results of Table (3) revealed that reserpine at a level of (1.0 ppm/ kg) significantly ($P \leq 0.05$) improved egg shape index as compared to the control and 0.5 ppm reserpine within both housing densities tested, however housing density seemed to release insignificant affect on this trait.

Yolk colour in degrees significantly ($P \leq 0.05$) improved with each increase in reserpine level in housing system 3 birds/cage, while in the housing density 4 birds/cage it significantly ($P \leq 0.05$) increased in both reserpine levels compared to the control group. On the other hand, housing density released insignificant effect on yolk colour Table (3).

Percentage of eggs with meat and blood spots decreased in almost a linear manner with increasing reserpine level compared to the control group in both housing densities, however housing density seemed to has a minimal effect on this trait. These results are in agreement with those obtained by Kondre *et al.,* (1964) found that the beneficial effect of tranquilizer in chickens diets has been improved egg quality during heat stress. Also, Balog and Hester (1989) noted that addition of Aspirin as tranquilizer in diet of layer breeder chickens reduced production of sell less eggs but had no effect on soft shelled eggs. However, Carew *et al.,* (1976) indicated that hen density did not significantly affected on shell strength, meat and blood spots of chicken eggs.

In general results of Table (3) concerned with egg quality may lead us to conclude that supplementing laying Japanese quail diets with reserpine improved the external and internal egg quality aspects especially under hot weather, which permit produced to market quail eggs of high quality and to provide hatcheries with eggs suitable for incubation.

Fertility and hatchability:

Results in Table (4) revealed that within each housing density both fertility and hatchability percentages increased with each increasing in reserpine level compared to the control group. These results are in disagreement with those obtained by Feltwell and Fox (1978) who noted that reserpine drug in diet of breeding turkeys at the time of egg production has been associated with fertility reduction. These results may indicated that reserpine increased the sexual activity and mating desire of Japanese quail especially under hot condition, However, housing density seemed to has no effect on both fertility and hatchability percentage of Japanese quail.

Physiological and Haematological parameters traits:

Results presented in Table (5) revealed that within each housing density of laying quail the average of rectal temperature decreased significantly ($P \leq 0.05$) with each increase in reserpine level compared to the control group. Results showed also that average of rectal temperature as affected with reserpine levels, regardless of housing density, significantly ($P \leq 0.05$) decreased from 42.15ºC (control) to 40.05 for group fed diet containing 1.0 ppm of reserpine Table (5). These results may indicated that reserpine released tranquilizing effects on birds by depressed their activities during hot weather resulting in lowering body temperature and better body heat dissipation. These results are in accordance with those of Kicak (1973) indicated that addition of reserpine at levels of 0.5 and 1.0 ppm to the diet of Fayoumi growing chicks reared under high temperature (90ºF) caused decreasing body temperature. Sabry (1998) found that tranquilizer decreased body temperature in broiler chickens especially under high temperature. On the other hand Gill *et al.,* (1986) showed that there were no significant effects of antistress drugs on body temperature of broiler breeders. As presented in Table (5) housing density seemed to has insignificant effect on quail rectal temperature irrespective of reserpine level.

Results of Table (5) revealed that respiration rate (RR) (breath/min) followed the same pattern as rectal temperature, where RR significantly ($P \leq 0.05$) decreased with each increase in reserpine level compared to the control group, however, housing density seemed to has insignificant effect on quail respiration rate. These results are in disagreement with those of Kicaka (1973) who indicated that addition of reserpine at levels of 0.5 and 1.0ppm to the diet of growing Fayoumi chicks reared under high temperature (90Fº) caused increased respiration rate. While, Gill, *et al.,* (1986) observed that there were no significant effect of antistress drugs on respiration rate of broiler chickens.

Results of heart rate (HR) show that within each housing density of quail HR significantly ($P \leq 0.05$) decreased with each increase in reserpine level compared to the control group. However, housing density seemed to has insignificant effect on (HR). These results confirmed with those reported by Strukie (1959) who found that reserpine decreased heart rate of White Leghorn chickens. Also, Speckmann and Ringer (1961) showed that at 11 weeks of age the heart rate of the Turkeys receiving reserpine was significantly ($P \leq 0.05$) lower than the control group. However, Strukie (1970) reported that reserpine slow heart rate by decreasing sympathetic tone progressively and increasing vagel tone. This is not surprising because reserpine depletes the catecholamine of the heart and blood appreciably within 4 hours and almost completely 2hr. after treatment. Line *et al.,* (1970) and Sabry (1998) found that tranquilizer significantly decrease ($P \leq 0.05$) the pulse rate at 4 and 7 weeks of age in broiler chickens raised under high temperature.

In general results presented in Table (5) may lead us to recommend supplementation of reserpine in laying quail diets as a tranquilizing agent during hot weather to avoid heat stress in birds, thus it improve the physiological status of birds and improved egg production performance. The tested reserpine level of this study (0.5 or 1.0 ppm /kg) seemed to be adequate to be incorporated in quail diets during hot weather.

Concerning blood parameters, results in Table (5) revealed that total plasma proteins (TPP) and total plasma albumin (TPA) of laying Japanese quail significantly ($P \leq 0.05$) decreased in groups fed diets containing reserpine compared to the control group within each housing density tested. The decreased of total plasma protein in laying quail fed varying level of reserpine may be due to that reserpine decrease some amino acid in blood. The fact that in agreement with results reported by Ahmed *et al.,* (1997) who indicated that reserpine administration may lead to decreases in the amino acids in blood, which is induced a decrease in the excitatory of amino acids in most ages of chickens. Also, glycine and alanine increase in the heart and decrease in serum, on the other hand the housing density seemed to has insignificant effect on TPP and TPA. These results are in disagreement with those of Gill *et al.,* (1986) who found that there was no significant effect by antistress drugs on total plasma protein of broiler breeders. Erisir and Erisir (2002) reported that total protein and albumin were not affected significantly by increasing density. Results of Table (5) show that reserpine level significantly ($P \leq 0.05$) increased total plasma globulin (TPG) compared to the control group while housing density did not released any significant effect on TPG of laying quail.

As illustrated in Table (5), total plasma lipids (TPL) (mg/100ml) significantly ($P \leq 0.05$) decreased within each housing density with increasing reserpine level compared to their control group however, housing density of birds released insignificant effect on birds TPL. These results may be explained by the fact that reserpine supplementation improve egg production and consequently increased the lipid carry over from plasma into eggs which resulted in a significant decrease in TPL thus, reserpine increased number of eggs laid during the experimental period. Total plasma triglyceride (TPTG) (mg/100ml) seemed to be insignificantly affected by either density or reserpine dietary level.

In conclusion, it can be concluded from this study that using tranquilizer i.e., reserpine of laying Japanese quail ration in hot climate and under high density cage were efficient in reducing mortality rate, improving performance of physiological and haematological parameters. Obviously this study has a very important for producers in hot climate, since the high temperature and high density causes decrease in production and increase mortality rate. However, this study has been needed further investigations.

Table (1): The composition of laying quail ration supplemented with different level of reserpine drug.

Ingredients	Percentages
Ground yellow corn (8.5%)	60.10
Soybean meal (44%)	20.00
Wheat bran (15.7%)	02.10
Laying concentrate (50.0%)	11.70
Sunflower oil	01.60
Calcium carbonate (Caco3)	04.00
Sodium chloride (NaCl)	00.20
Vitamin and mineral premix*	00.30
Total (Kg)	**100.00 kg**
Calculated diet composition:	
C.P %.	20.00
ME Kcal / kg.	2902
C.F %.	03.0
Ca %.	02.50
Available phosphorus %.	00.38
Lysine %.	01.10
Methionine + cystine %.	01.11
Analyzed	
C.P %	19.90

*Vitamin and Mineral mixture, each 3kg contains: Vit. A 100000 IU, Vit. D 200000 ICU, Vit. E 10000 IU, Vit B1 1000 mg, Vit. B2 5000mg, Vit B6 1500 mg, Vit. B12 10mg, Pant. acid 1000mg, Folic acid 1000mg, Biotin 50mg, Niacin 3000mg Fe. 30000mg, Mn 6000mg, Cu 40000mg, Zn 50000mg, I.300mg, Co. 100mg and selenium 100mg.

Table (2): Performance traits of laying Japanese quail ($\bar{x}$ ± S.E) as affected by reserpine and density during the experimental period.

Item	Treatments / Density	T1 (control) 0.0 ppm	T2 0.5 ppm	T3 1.0 ppm	Overall mean
Initial body weight (g)	3	180.00±5.90^a	182.22±7.80^a	184.0±7.30^a	182.07±7.0^A
	4	181.50±6.50^a	183.11±7.00^a	183.0±7.10^a	182.54±6.9^A
	Overall mean	180.75±6.21^a	182.66±7.31^a	183.5±7.20^a	
Final body weigh (g)	3	193.11±8.40^b	210.0±9.19^a	212.0±8.13^a	205.04±8.60^A
	4	190.00±8.19^b	211.16±9.81^a	212.50±9.10^a	204.55±9.03^A
	Overall mean	191.56±8.30^b	210.58±9.51^a	212.25±8.62^a	
Feed intake g/bird/day	3	22.70±1.49^a	22.00±1.91^a	22.60±1.31^a	22.43±1.60^A
	4	20.45±1.14^a	22.93±1.30^a	22.21±1.83^a	21.86±1.45^A
	Overall mean	21.58±1.32^a	20.97±1.61^a	20.41±1.57^a	
Egg production (%)	3	69.92^c	75.61^b	83.31^a	76.28^A
	4	65.51^c	74.93^b	80.62^a	73.65^A
	Overall mean	67.72^c	75.22^b	81.77^a	
Egg weight (g)	3	11.51±0.73^b	12.62±1.08^a	12.76±1.09^a	12.10±0.96^A
	4	11.32±0.65^b	12.03±0.96^a	12.73±1.12^a	12.22±0.91^A
	Overall mean	11.42±0.69^b	12.33±1.02^a	12.75±1.11^a	
Egg mass (kg)	3	11.210^c	12.00^b	13.199^a	13.136^A
	4	08.133^c	09.160^b	10.122^a	09.138^B
	Overall mean	11.163^C	12.07^b	13.194^a	
Feed conversion (kg food/kg eggs)	3	4.04±0.06^a	3.22±0.12^b	3.00±0.09^c	3.42±0.09^B
	4	4.86±0.05^a	3.58±0.14^b	3.20±0.08^c	3.88±0.08^A
	Overall mean	4.45±0.05^a	3.40±0.13^b	3.10±0.09^b	
Mortality (%)	3	8.17^a	3.00^b	2.50^c	4.56^B
	4	8.83^a	3.66^b	2.90^c	5.13^A
	Overall mean	8.50^a	3.33^b	2.70^c	

a, b, c ..... Means in each row with different superscript are significantly different ($P \leq 0.05$).

Table (3): Egg quality traits of laying Japanese quail (x- ± S.E) as affected by reserpine drug and density during the experimental period.

Item	Treatments / Density	T1 (control) 0.00 ppm	T2 0.5 ppm	T3 1.0 ppm	Overall mean
Egg weight (g)	3	11.19±0.33 b	12.07±0.30 a	12.40±0.39 a	11.88±0.36 A
	4	11.23±0.35 b	12.15±0.34 a	12.30±0.40 a	11.89±0.38 A
	Overall mean	11.21±0.36 b	12.11±0.40 a	12.35±0.41 a	
Specific gravity	3	1.070±0.89 b	1.074±0.96 a	1.074±0.93 a	1.073±0.77 A
	4	1.070±0.80 b	1.074±0.87 a	1.074±0.81 a	1.073±0.89 A
	Overall mean	1.070±0.85 b	1.074±0.92 a	1.074±0.87 a	
Albumen weight (g)	3	6.20±3.60 a	6.44±3.10 a	6.61±4.10 a	6.42±3.90 A
	4	6.22±4.10 a	6.43±3.60 a	6.56±3.80 a	6.40±3.50 A
	Overall mean	6.21±4.00 a	6.44±3.35 a	6.59±3.90 a	
Yolk weight (g)	3	3.60±0.71 b	4.03±0.89 a	4.01±0.79 a	3.88±0.79 A
	4	3.62±0.62 b	4.11±0.82 a	4.01±0.82 a	3.91±0.76 A
	Overall mean	3.61±0.67 b	4.07±0.86 a	4.01±0.80 a	
Shell weight (g)	3	1.39±0.38 b	1.60±0.40 a	1.78±0.56 a	1.59±0.31 A
	4	1.39±0.36 b	1.61±0.54 a	1.73±0.50 a	1.58±0.43 A
	Overall mean	1.39±0.40 b	1.60±0.53 a	1.74±0.55 a	
Shell thickness (mm x 100)	3	0.29±0.11 b	0.36±0.10 a	0.38±0.07 a	0.34±0.06 A
	4	0.31±0.09 b	0.35±0.09 a	0.38±0.06 a	0.35±0.06 A
	Overall mean	0.30±0.13 b	0.36±0.80 a	0.38±0.06 a	
Shell breaking strength(kg)	3	5.22±1.99 c	6.99±2.90 b	7.20±3.90 a	6.47±4.11 A
	4	5.13±1.80 c	6.33±1.13 b	7.00±3.00 a	6.15±3.23 A
	Overall mean	5.18±1.89 c	6.66±2.01 b	7.1±3.45 a	
Egg shape index	3	0.60±0.03 b	0.61±0.08 b	0.65±0.10 a	0.62±0.09 A
	4	0.63±0.01 b	0.62±0.07 b	0.66±0.06 a	0.63±0.08 A
	Overall mean	0.62±0.02 b	0.61±0.05 b	0.66±0.13 a	
Yolk colour	3	5.80±1.90 c	7.80±1.80 b	8.80±1.70 a	7.46±1.90 A
	4	5.60±2.10 b	8.80±1.30 a	8.90±1.30 a	7.77±1.50 A
	Overall mean	5.70±2.26 c	8.30±1.65 b	8.85±1.51 a	
Eggs % showing any meat or blood spots	3	3.50	1.30	0.00	2.40
	4	3.60	1.50	0.00	2.55
	Overall mean	3.55	1.40	0.00	

a, b, c ….. Means in each row with different superscript are significantly different ($P \leq 0.05$).

Table (4): Fertility and hatchability percentage of laying Japanese quail as affected by reserpine drug and density at the end of experimental period.

Items	Treatments / Density	T_1 (control)	T_2	T_3	Overall mean
		0.0 ppm	0.5 ppm	1.0 ppm	
Fertility %	3	78.40	82.31	83.62	81.44
	4	78.00	81.35	83.0	80.78
	Overall mean	78.2	81.83	83.31	
Hatchability %	3	66.75	75.66	78.83	73.75
	4	65.70	75.0	78.36	73.02
	Overall mean	66.23	75.33	78.60	

Table (5): physiological and haematological parameters of laying Japanese quail ($\bar{x}$ ± S.E) as affected by reserpine levels and density.

Item	Density \ Treatments	T1 (control) 0.00 ppm	T2 0.5 ppm	T3 1.0 ppm	Overall mean
Rectal body temperature (RBT).	3	42.00±1.20 [a]	40.90±1.10 [b]	40.00±2.40 [c]	40.90±2.50 [A]
	4	42.30±1.10 [a]	40.80±1.22 [b]	40.10±1.60 [c]	40.90±1.90 [A]
	Overall mean	42.15±1.15 [a]	40.85±1.16 [b]	40.05±2.00 [c]	
Respiration rate / minute (RR).	3	72.00±3.16 [a]	69.0 ±4.20 [b]	65.00±4.90 [c]	68.67±4.50 [A]
	4	73.00±3.20 [a]	68.00±4.00 [b]	66.00±4.60 [c]	69.00±5.90 [A]
	Overall mean	72.50±3.33 [a]	68.50±4.10 [b]	65.50±4.75 [c]	
Heart rate / minute (HR).	3	430.00±3.10 [a]	390.00±3.60 [b]	380.00±2.60 [c]	400.00±3.10 [A]
	4	431.00±3.10 [a]	393.00±3.60 [b]	388.00±2.00 [c]	404.00±3.10 [A]
	Overall mean	430.50±3.10 [a]	391.50±3.60 [b]	384.00±2.30 [c]	
Total plasma protein (g/100ml) (TPP).	3	4.20±1.36 [a]	3.65±1.11 [b]	3.86±1.10 [b]	3.90±1.30 [A]
	4	4.21±1.11 [a]	3.64±1.99 [b]	3.80±1.00 [b]	3.88±1.60 [A]
	Overall mean	4.21±1.24 [a]	3.65±2.93 [b]	3.83±1.05 [b]	
Total plasma albumin (g/100ml) (TPA).	3	1.84±0.09 [a]	0.84±0.09 [b]	0.97±0.07 [b]	1.22±0.06 [A]
	4	1.83±0.09 [a]	0.84±0.02 [b]	0.92±0.05 [b]	1.20±0.09 [A]
	Overall mean	1.84±0.09 [a]	0.84±0.06 [b]	0.94±0.06 [b]	
Total plasma globulin (g/100ml) (TPG).	3	2.36±1.10 [b]	2.81±1.16 [a]	2.88±1.33 [a]	2.68±1.06 [A]
	4	2.38±1.36 [b]	2.80±1.00 [a]	2.90±1.89 [a]	2.69±1.96 [A]
	Overall mean	2.37±1.50 [b]	2.81±1.08 [a]	2.89±2.10 [a]	
Total plasma lipids (mg/100ml) (TPL).	3	794.11±8.12 [a]	655.0±9.16 [b]	709.0±11.21 [c]	719.37±7.11 [A]
	4	790.21±6.25 [a]	645.13±8.33 [b]	702.3±10.33 [c]	712.55±7.00 [A]
	Overall mean	792.16±7.15 [a]	650.07±9.02 [b]	705.7±10.80 [c]	
Total plasma triglyceride (mg/100ml) (TPT).	3	47.71±3.33 [a]	49.41±4.11 [a]	51.54±6.16 [a]	49.55±4.30 [A]
	4	47.38±4.10 [a]	49.00±4.00 [a]	51.60±5.11 [a]	49.33±3.26 [A]
	Overall mean	47.55±3.38 [a]	48.21±4.30 [a]	51.57±6.50 [a]	

a, b, c ..... Means in each row with different superscript are significantly different ($P \leq 0.05$).

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الملخص العربي

تأثير عقار الـ Reserpine على الأداء الإنتاجي للسمان الياباني البياض المربى بكثافات مختلفة تحت ظروف المناخ الحار

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أجريت هذه الدراسة لبحث تأثير استخدام مستويات مختلفة من عقار الـ Reserpine كمهدئ على الأداء الإنتاجي للسمان الياباني البياض وذلك تحت ظروف المناخ الحار (أشهر الصيف) وتحت كثافات مختلفة. استخدم عدد ٢٧٠ طائر عند عمر سبعة أسابيع حيث قسمت عشوائياً إلى ثلاث معاملات متساوية، الأولى وهي مجموعة المقارنة، المعاملة الثانية احتوت على ٠,٥ جزء في المليون من العقار، والمعاملة الثالثة احتوت على ١,٠ جزء في المليون لكل كيلو جرام علف. قسمت كل معاملة إلى كثافتين مختلفتين ٣ طيور (٧,٥ سم/طائر) في كل قفص مقابل ٤ طيور (٥,٦ سم/طائر).

واحتوت كل كثافة على ثلاث مكررات بواقع ١٥ طائر في كل مكررة. تم تكوين العليقة الأساسية طبقاً للاحتياجات الغذائية للسمان البياض وتم تقديم الغذاء والماء بحرية للطيور طوال فترة التجربة. استمرت التجربة لمدة (١٠٨ يوم) تم خلالها تسجيل درجة الحرارة والرطوبة الجوية طوال فترة التجربة والتي كان متوسطها ٣٥م°، ٦٥% رطوبة نسبية.

ويمكن تلخيص النتائج المتحصل عليها كالتالي:

١- وزن الجسم النهائي، إنتاج البيض، وزن البيض، كتلة البيض الناتجة، وصفات جودة البيض، نسبة الخصوبة والفقس كلها زادت معنوياً بزيادة مستوى العقار، بينما انخفض معنوياً معامل التحويل الغذائي ونسبة الوفيات بزيادة مستوى العقار ولم يتأثر معنوياً الغذاء المأكول.

٢- لوحظ تداخل معنوي في وزن الجسم النهائي وإنتاج البيض، ووزن البيض، كتلة البيض معامل التحويل ونسبة الوفيات.

٣- انخفض معنوياً كل من درجة حرارة الجسم، معدل التنفس، معدل ضربات القلب، بروتينات البلازما الكلية، الألبيومين، الدهون الكلية بزيادة مستوى العقار. بينما لوحظ اتجاه مخالف لمستوى الجلوبيولين في البلازما. لم يتأثر مستوى الجليسريدات الثلاثية معنويا بزيادة مستوى العقار في الغذاء.
٤- لم تؤثر الكثافة على صفات الجودة للبيض أو المقاييس الفسيولوجية أو مكونات الدم للسمان الياباني البياض.