COMPARSONS OF LAYING PERFORMANCE CURVES FOR MAMOURAH AND SILVER MONTAZAH LOCAL CHICKEN STRAINS

By

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ABSTRACT: *The objective of this study was to derive mathematical curves that describe the weekly production of egg number, hen-day rates, egg weight, egg mass (g/hen/day), and production efficiency ratio. A total of 296 at 22 weeks old hens of Mamourah and Silver Montazah (148 each strain) were randomly chosen from a large floor-reared flock. Where housed in individual cages, and recorded weekly egg number, egg with and calculated hen day percentage and production efficiency ratio to 28 weeks of production. Results indicated that Silver Montazah hens significantly (P≤ 0.001) exceeded the Mamourah one in egg number and hen-day percentage, but had lower eggs. While egg mass (g/hen/day) and production efficiency ratio were not affected by strain. All traits studied significantly (P≤ 0.001) increased with age of period production to reach a maximum during 8-12 weeks of age period production and decreased gradually except egg weight significantly (P≤ 0.001) increased with advancing age. All traits studied were significantly (P≤ 0.01) affected by the interaction between strain and age of period production. Curves for egg number, hen-day percentage, egg weight, egg mass and production efficiency ratio of Silver Montazah and Mamourah laying hens described results well where (0.752 ≤ adj. R^2 ≤ 1.0)*

INTRODUCTION

In Egypt, new developed strains derived from local and standard breeds are utilized in commercials chicks production. These strains are more adapted to the local environmental conditions and may also serve as genetic basis for establishing new strains for meat and egg production. El- Dakroury *et al* (1983) found that Silver Montazah significantly excelled Gimmizah in egg production rate. Also, Abd- El-Galil (1993) showed significant

differences among local strains during all laying intervals studied. Goher *et al.* (1994) reported that egg production rate for Mamourah strain was significantly higher ($P \leq 0.01$) than that of Gimmizah one during three months of period production and Nofal *et al.* (2000) during period ten months production. Samak (2001) found that egg production rate increased significantly with age, reaching maximize values at the 36 weeks of age then decreased towards the end of experimental period . Egg weight was significantly increased with age and reached its maximum value at the end of age (55.67 gm) found by (Samak 2001).

The objective of this study was to compute appropriate curves that describe the relationship between egg production performance with age in Mamourah and Silver Montazah developed local strains .

MATERIALS AND METHODS

The present study was carried out at Gimmizah Research Station, Animal production Research, Institute Agric. Res. Center, Ministry of Agric. A total of 296 at 22 weeks of age old hens from Mamourah and Silver Montazah (148 each strain) were randomly chosen from a large reared in the floor flock. Birds were housed in individual cages and maintained under the same managerial, hygienic and environmental conditions. Feed and water was provided *ad- labium.* The composition and calculated chemical analysis of the fed ration are presented in Table (1). Hens were exposed to 16-hr light daily. All birds were individually weighed at the initial of the experiment and the end of experimental period. Egg number and weight were recorded weekly. Production efficiency ratio was calculated by the following equation = egg mass (gm day) / Kg live body weight (Nofal *et al;* 2006) .

Data were analyzed according to General linear Models (GLM) procedure and Duncan's (1955) Multiple range test were calculated by using SPSS version 10 (1999) computer program using factorial design as the following model:

$$Yij = \mu + Si + Pj + (SP)ij + eij$$

Where Yij = The observed dependent variable, μ = Over all mean, Si= Effect of Strain (i=1, 2) Pj = Effect of Period (j=1,7), (SP)ij = The j th period within i th strain (ij= 1,----14), and eij = The random residual error. Compute appropriate mathematical curves that describe the prediction equation to relationship egg production performance with advancing age calculated by using Microsoft Excel (2007) computer program . The polynomial relationship methods expressed the regression as the following equation:

$$\dot{Y} = a + b_1 x \text{ or } \dot{Y} = a + b_1 x + b_2 x^2 + \ldots\ldots\ldots\ldots b_n x^n$$

Where Y=independent variable; x = dependent variables.

RESULTS AND DISCUSSION

It is evident from Table 2 that egg number and hen- day percentage were significantly ($P \leq 0.001$) higher in Silver Montazah than Mamourah local strain. This results are close agreement with those obtained by El-Dakroury *et* al 1983 who found that Salver Montazah significantly ($P \leq 0.001$) excelled Gimmizah of egg production rate. Egg number for Mamourah was significantly($P \leq 0.01$) higher than those Gimmizah during period three month of production (Goher *et al*, 1994, and Nofal *et al*, 2000).

Egg number and hen day percentage were significantly ($P \leq 0.001$) increased with advancing period of production to reach peak at the 5^{th} week of laying production and settable constant to the 14^{th} week of production and reduced egg number and hen-day percentage with advance of age period production (Table 3). These results are in close agreement with those obtained by Ahn *et al*, (1997) who showed that age of the hens had a significant ($P \leq 0.05$) effect on the whole egg production from 28 to 97 weeks old in single Comb White Leghorn. Samak, (2001) found that egg production rate significantly ($P \leq 0.001$) increased by advancing age reaching its maximum at 36 weeks of age (peak of egg production) then slightly decreased in local strain chickens. Nofal and Enany, (2005) who found that egg number and hen day percentage were significantly ($P \leq 0.01$) decreased by advancing production interval after 40 weeks of age in Mamourah laying hens. Egg number and hen-day percentage were significantly ($P \leq 0.01$) increased by advance of egg production period to reach the peak (from 15 – 21 weeks of age) then both decreased in Japanese quail (Nofal and Hassan, 2001). Egg number and hen day percentage were significantly ($P \leq 0.001$) increased by advancing of egg production intervals to reach the peak at 36 weeks of age, then both decreased in Gimmizah laying hens Nofal *et al*, (2006).

Egg number and hen day percentage were significantly ($P \leq 0.001$) affected by interaction strain with age period production , the differences due to increased each of egg number and hen-day percentage in Silver Montazah from the second to the six period production than Mamourah strain (Fig 1 and 2) . These results disagree with obtained by Samak, (2001).

Fig 1. When expressed the curve polynomial relationship method to predict egg number with variable age weeks of production using the following equation of Mamourah laying hens.

$\hat{Y} = - 2.743 + 3.248\ x - 0.545x^2 + 0.048x^3 - 0.002x^4 + 5.81266\ E\text{-}05\ x^5 - 5.84542E\text{-}07\ x^6$. While using the following equation in Silver Montazah laying hens :

$\hat{Y} = - 2.321 + 2.805x - 0.422x^2 + 0.033x^3 - 0.001x^4 + 3E\text{-}05x^5 - 3E\text{-}07x^6$;

Where $\hat{Y}$ = egg number ; x = age weeks of production . The polynomial relationship was significantly ($P \leq 0.01$) and the adjusted coefficient of determination ($0.868 \leq$ adj. $R^2 \leq 1.0$).

Fig 2. Showed the curve polynomial relationship to predict hen-day percentage of Mamourah laying hens with variable age of production expressed by the following equation .

$\hat{Y} = - 101.468 + 133.369\ x - 36.033\ x^2 + 3.997\ x^3 - 0.1604\ x^4$

But using the following equation in Silver Montazah laying hens:

$\hat{Y} = - 96.117 + 125.117\ x - 32.825\ x^2 + 3.661\ x^3 - 0.154\ x^4$. Where $\hat{Y}$ = Hen-day percentage, x = age month of production . The relationship was significantly ($P \leq 0.001$) and the adjusted coefficient of determination ($0.992 \leq$ adj. $R^2 \leq 1.0$).

Egg weight was significantly ($P \leq 0.001$) increased in Mamourah laying hens than Silver Montazah one (Table 2) . Similar results were obtained by Hassan (1991) and Abd – El-Galil (1993) who found significant differences ($P \leq 0.001$) in egg weight between strain . While disagree with those obtained by Goher *et al*, (1994) , Nofal *et al*, (2000) and Samak (2001) who found that egg weight did not affect by local strain .

Egg weight was significantly ($P \leq 0.001$) increased gradually with increasing age of production to the 12^{th} week of production and constant from the 12^{th} to the 24^{th} week of production and increased to maximum at the end of the first year of production (Table 2). These results are in close agreement with those revealed by Fletcher *et al*, (1981) who showed that egg weight was significantly ($P \leq 0.001$) increased with increasing flock age in Shever hens , Hussein *et al*, (1993) of Hy-Line W36 hens, Roque and Soares, (1994) of Cobb500 broiler breeder hens, Samak, (2001) in local strain, Peebles *et al*, (2001) of Arbor Acres hens and in Mamourah laying hens (Nofal and Salem, 2000 , Nofal and Enany, 2005, and Nofal et al. 2006). The same trend was indicated in Japanese quail (Sharaf 1996 , Mady and Ahmed , 1998, and Nofal and Hassan, 2001).

Egg weight was significantly ($P \leq 0.001$) affected by interaction strain with age period production, the differences due to increased egg weight in Mamourah from the 1th to the 6th week of period production than Silver Montazah strain (Fig 3) . These results disagree with obtained by Samak, (2001).

The curve liner relationship to prediction egg weight with variable age month of egg production expressed as the following equation in Mamourah laying hens :$\hat{Y} = 44.266 + 1.311\ x$. But used the equation in Silver Montazah laying hens : $\hat{Y} = 41.604 + 1.710\ x$, where $\hat{Y}$ = egg weight (gm) ; x = age month of egg production.

The liner relationship was significantly ($P \leq 0.01$) and the adjusted coefficient of determination ($0.752 \leq$ adj. $R^2 \leq 1.0$) Fig 3.

It is evident from Table 3 found that egg mass (g / hen / day) of Mamourah laying hens was not affected by strain. Similar results are close agreement with obtained by Nofal *et al*, (2000) and Samak (2001) who found did not differences in egg mass between Gimmizah ,Mamourah and Bandara chicken strains. In contrast Goher *et al*, (1994) showed that egg mass for Momourah laying was significantly ($P \leq 0.05$) heavier than that of Gimmigah laying in the period of (0-11 months).

Data in Table 3 showed that egg mass (g / hen / day) was significantly ($P \leq 0.001$) increased to reach maximum (peak) during 8-12 weeks of period production and reduced gradually with advance age of period production. These results are close in agreement with those obtained by Samak, (2001) who showed that egg mass was significantly ($P \leq 0.001$) increased as pullets grow older reaching its maximum at 36 weeks of age (peak of egg production), then after its decreased with advance of age in local strain chickens, (Nofal *et al*, 2006) in Mamourah laying hens, (Sharaf 1996, and Nofal and Hassan, 2001) of Japanese quail. Nofal and Enany, (2005) who found that egg mass (g / hen /day) was decreased significantly ($P \leq 0.01$) by advancing periods of production after 40 weeks of age in Mamourah laying hens.

Egg mass (g / hen / day) was significantly ($P \leq 0.001$) affected by interaction strain with age of period production, the differences due to increased egg mass in Silver Montazah from the 3rd to the 6th of period production than Mamourah strain (Fig 4) . These results disagree with obtained by Samak, (2001).

The curve polynomial relationship to predict egg mass (g / hen/day) with variable age month of production using the following equation in Mamourah laying hens :

$\hat{Y} = - 5.230 + 39.135\ x - 12.885\ x^2 + 1.676\ x^3 - 0.078\ x^4$. While the equation in Silver Montazah laying hens : $\hat{Y} = - 6.722 + 37.99x - 11.94x^2 + 1.566x^3 - 0.077x^4$. Where $\hat{Y}$ = egg mass (gm / hen / day) ; x = age month of production (Fig 4). The polynomial relationship was significantly ($P \leq 0.01$) and the adjusted coefficient of determination ($0.962\_ \leq$ adj. $R^2 \leq 1.0$).

Production efficiency ratio (gm egg / kg live body weight) was not affected by strain (Table 3). It may be due to no differences between Mamourah and Silver Montazah in egg mass (gm / hen / day).

Production efficiency ratio was significantly ($P \leq 0.01$) increased by advancing age of period production to reach maximum ratio during the 16^{th} to 24^{th} weeks of periods production and its after decreased (Table 3). It may be due to increased egg mass in this periods, Similar results agreement with those obtained by Ouda (2008) who found that production efficiency ratio was significantly ($P \leq 0.01$) increased by advancing age of period production to reach maximum ratio during the 35^{th} to 38^{th} weeks age and its after decreased.

The curve polynomial relationship to predict production efficiency ratio with variable age month of period production expressed as the following equation in Mamourah laying hens :

$\hat{Y} = - 3.6038 + 27.6462\ x - 8.4975\ x^2 + .9681\ x^3 - 0.0368\ x^4$. But used the equation in Silver Montazah laying hens : $\hat{Y} = - 4.171 + 26.248\ x - 7.346\ x^2 + 0.7697\ x^3 - 0.02764\ x^4$. Where $\hat{Y}$ = Production efficiency ratio ; x = age period of period production . The polynomial relationship was significantly ($P \leq 0.001$) and the adjusted coefficient of determination ($0.865 \leq$ adj. $R^2 \leq 1.0$) as showed in Fig 5.

It may be concluded that ,Silver Montazah laying hens were significantly ($P \leq 0.001$) improved egg number, egg mass, but lower egg weight than Mamourah laying hens, while egg mass (g / hen / day) and production efficiency ratio did not affect by strain. All traits studied were significantly ($P \leq 0.001$) increased with advancing age of period production to reach maximum during 8-12 weeks age of period production and decreased gradually by advancing period except egg weight significantly ($P \leq 0.001$) increased with advancing age of period production . All traits studied were significantly ($P \leq 0.01$) affected by interaction between strain

and age of period production. Curves for egg number, hen-day percentage, egg weight, egg mass and production efficiency ratio of Silver Montazah and Mamourah laying hens described results well ($0.752 \leq$ adj. $R^2 \leq 1.0$).

Table 1 : Composition of the basal diet

Ingredient	%
Yellow corn	65.40
Soya been meal 44 %	22.00
Wheat bran	3.00
Di – Cal – Ph	1.39
Lime stone	7.44
Salt (Nacl)	0.30
Vit. + Minerals **	0.30
DL – Methonine	0.17
Total	100.
Calculated analysis*	
Crude protein %	16.05
ME K Cal	2726.76
Crude fiber %	3.375
Ca %	3.204
Total Ph %	0.619
Lysine %	0.820
Methonine %	0.449

* according NRC (1994)

** Each 2.5kg . of Vit & Min . Mixture contain : Vit A 12000.000 IU, Vit D3 2000.000 IU ,Vit E 10.000 mg ,Vit k3 2000 mg , Vit B1 1000 mg , Vit , B2 4000mg , Vit B6 1500 mg , Vit b12 10 mg , Niacin 50.000mg , Pantothenic acid 10.000 mg , Choline chloride 500.000 mg , Capper 10.000, Iodine 1.000 mg , Iron 30. 00mg , Manganese 55.000 mg , Zinc 55.000 mg and Selenium 100 mg .

Table 2: Means ($\bar{X}$ ± SE) of egg number , egg weight (g) and Hen –day percentage as affected by strain and period (during the first 28 weeks of production).

Treatment	Egg number	Egg weight (g)	Hen-day %
Strain	***	***	***
Mamourah	16.670± 0.160 b	50.83±0.145 a	59.282±0.570 b
Silver Montazah	17.449±0.173 a	48.73±0.144 b	62.287±0.617 a
Over all mean	17.066±0.118	49.39±0.103	60.960±0.422
Periods of production	***	***	***
0 -4 weeks	14.360±0.436 d	44.40±0.206 e	51.460± 1.557 d
4 -8 weeks	19.960±0.217 a	46.84±0.209 d	71.165±0.772 a
8- 12 weeks	20.075±0.217 a	49.32±0.187 c	71.695±0.775 a
12-16weeks	19.171±0.241 b	50.49±0.198 b	68.468±0.861 b
16- 20weeks	16.383±0.273 c	50.79±0.192 b	58.497±0.847 c
20- 24 weeks	15.836±0.255 c	51.05±0.279 b	56.630±0.905 c
24- 28 weeks	13.311±0.246 e	53.13±0.255 a	47.567±0.882 e
Over all mean	17.066±0.118	49.39±0.103	60.960±0.442

Means within the same column with different litters are differ significantly ($P \leq 0.05$) * ($P \leq 0.001$).**

Table 3: Means ($\bar{X}$ ± SE) of egg mass (gm / hen / day) and efficiency of production as affected by strain and period (during the first 28 weeks of production).

Treatment		Production Efficiency ratio
Strain		
Mamourah	29.405±0.283	20.203±0.215
Silver Montazah	30.249±0.291	20.556±0.210
Over all mean	30.031±0.203	20.383±0.150
Periods of production	***	***
0 - 4 weeks	22.817±0.691 e	15.635±0.502 e
4 - 8 weeks	33.246±0.373 b	23.000±0.375 a
8 - 12 weeks	35.296±0.392 a	23.948±0.320 a
12 -16weeks	34.490±0.422 ab	23.276±0.311 a
16 - 20weeks	29.614±0.427 c	19.610±0.300 b
20 - 24 weeks	28.892±0.453 c	19.483±0.306 b
24 - 28 weeks	25.369±0.465 d	17.075±0.328 b
Over all mean	30.031±0.203	20.383±0.175

Means within the same column with different litters are differ significantly ($P \leq 0.05$).
*** ; ($P \leq 0.001$); NS ; not significant.

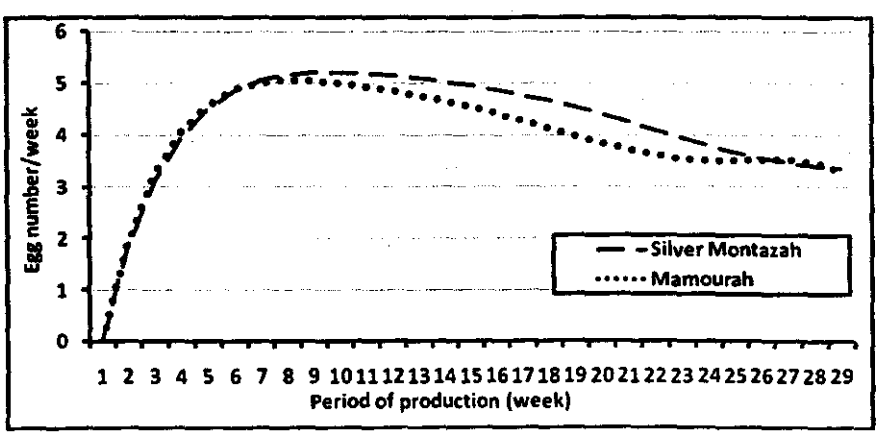

Fig 1: Egg number as affected significantly ($P \leq 0.001$) by interaction age of period production with strain . Correlation within strain Mamourah and Silver Montazah (r ; 0.951 and 0.947, ($P \leq 0.001$) of age weeks period production with egg number .

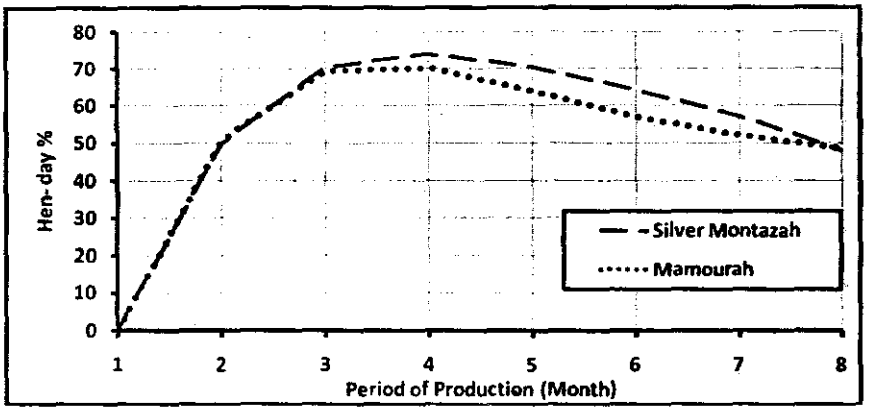

Fig 2: Hen- day percentage as affected significantly (P≤ 0.001) by interaction age of period production with strain . Correlation within strain Mamourah and Silver Montazah (r; 0.999 and 0.998, P≤ 0.001) of period production with hen- day percentage.

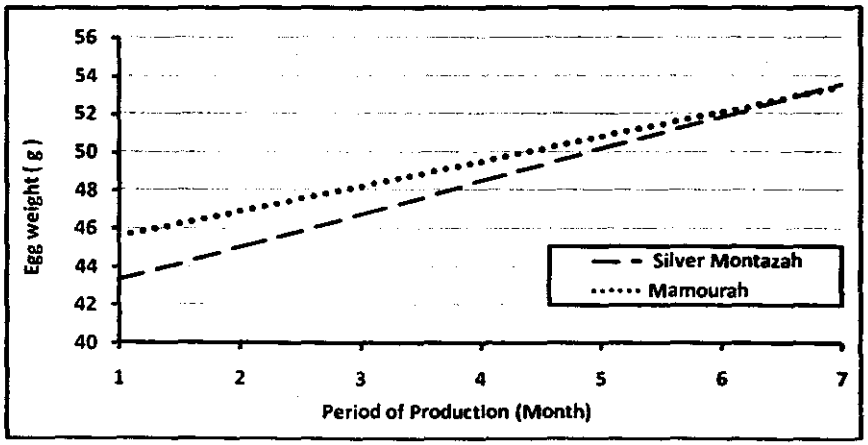

Fig 3 : Egg weight as affected significantly by interaction age of period production with strain . Correlation within strain Mamourah and Silver Montazah (r; 0.891 and 0.962, P≤ 0.001) of period production with

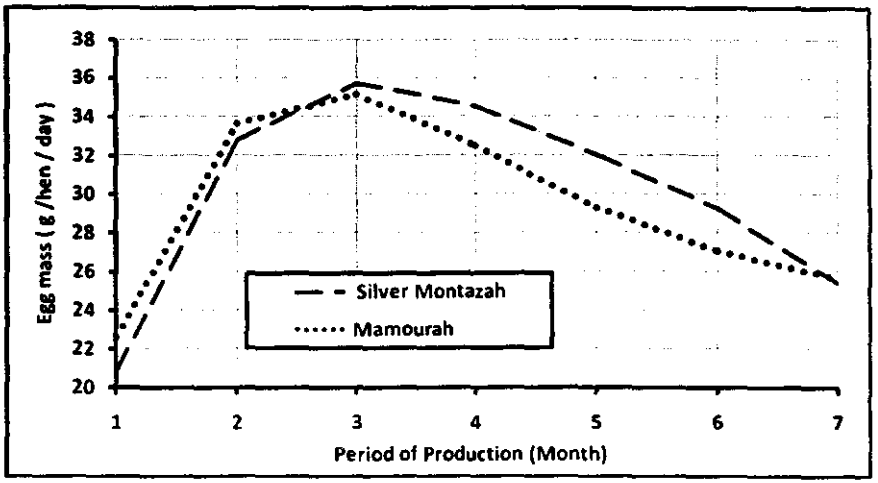

Fig 4 : Egg mass (gm/ hen/ day) as affected significantly by interaction age of period production with strain . Correlation within strain Mamourah and Silver Montazah (r; 0.994 and 0.990, P≤ 0.001) of period production with egg mass (gm/ hen / day).

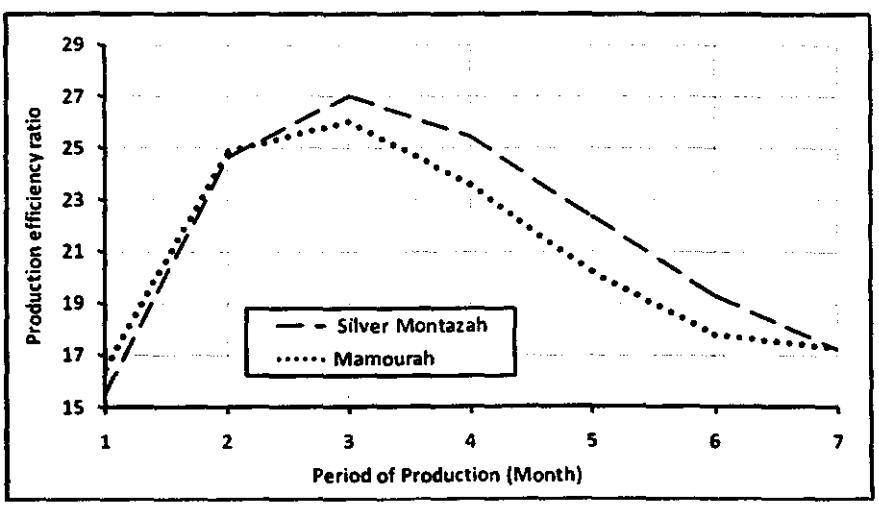

Fig 5: Production efficiency ratio as affected significantly by interaction age of period production with strain. Correlation within strain Mamourah and Silver Montazah (r; 0.958 and 0.977, P≤ 0.001) of period production with production efficiency ratio (gm egg mass) day) / Kg body weight).

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الملخص العربي

مقارنة منحنيات وصف الأداء الإنتاجي للبيض لسلالتي دجاج المعمورة والمنتزه الفضي

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معهد بحوث الإنتاج الحيواني-مركز البحوث الزراعية- وزارة الزراعة- الدقي .

تهدف هذه الدراسة إلى وصف الأداء الإنتاجي للبيض على شكل منحنيات بإدخال العمر للفترات الإنتاجية مع المخرجات كعدد البيض – معدل الإنتاج اليومي - وزن البيضة – كتلة البيضة – كفاءة الإنتاج النسبية . تم استخدام ٢٩٦ دجاجة (١٤٨ من كل سلالة) اختيرت عشوائيا من قطيع كبير الحجم مربى تربية أرضية . سكنت الطيور في بطاريات فردية عند عمر ٢٢ أسبوع وتم تسجيل الإنتاج من وضع أول بيضة لكل دجاجة من عمر ٢٤ أسبوعا حتى ٥٢ أسبوعا من العمر (٢٨ أسبوعا إنتاجيا) وكانت النتائج كالتالي :-

١- أمهات سلالة المنتزه الفضي تفوقت معنويا (٠.٠١) في عدد البيض – نسبة الإنتاج اليومي ولكن كان وزن البيضة اقل بينما لا توجد فروق بين كتلة البيض اليومي وكفاءة الإنتاج النسبي بين السلالتين .

٢- كل الصفات الإنتاجية المدروسة ازدادت معنويا (٠.٠١) بتقدم الفترات الإنتاجية لتصل إلى أقصاها في الفترة من٨ -١٢ أسبوع إنتاجي ثم تقل تدريجيا بالتقدم في العمر عدا صفة وزن البيضة .

٣- كل الصفات الإنتاجية المدروسة تأثرت معنويا (٠.٠١) بالتداخل بين السلالة وتقدم الفترات الإنتاجية .

٤- برسم منحنيات الانحدار المتعدد لكلا من عدد البيض – معدل الإنتاج اليومي - وزن البيضة – كتلة البيضة – كفاءة الإنتاج النسبية للسلالتين كان معامل التحديد المعدل أعلى من ٠.٧٢٥ .

التوصية :- أن سلالة المنتزه الفضي تتفوق على سلالة المعمورة في عدد البيض ونسبة الإنتاج اليومي بينما وزن البيضة كان اقل – كما أن معامل الارتباط للصفات الإنتاجية يكون عاليا جدا مع الفترات الإنتاجية للسلالات.