Egyptian J. Anim. Prod. (2000) 37 (2) : 121-130

EVALUATION OF SOME IMMUNOLOGICAL AND HORMONAL VARIATIONS AMONG SEVERAL LAYING STRAINS

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SUMMARY

This study was conducted to evaluate some immunological and hormonal variations among Fayoumi, Baladi, Gimmizah, Bandara, Golden Montaza, Rhode Island Red and Lohman Selected Leghorn (LSL) hens.

Eighteen pullets of each strain, at 20 weeks of age, were divided into two body weight categories (L: low and H: high). Pullets of each category were subdivided into three replicates; each replicate was allocated in one cage. Pullets of Fayoumi and Baladi fed a diet of 13% crude protein and 2880 Kcal ME/Kg and other pullets fed a diet of 16% crude protein and 2918 Kcal ME/Kg. The experiment was extended till 60 weeks of age.

Results indicated that Fayoumi and Baladi hens had ($P < 0.05$) lower productive performance; progesterone and estradiol concentrations in blood serum, but ($P< 0.05$) higher immune responses (total red blood cells, total white blood cells and antibody titer) than other strains. However, LSL hens recorded opposite trends. While the new developed strains showed intermediate status of egg production performance as well as serum steroid hormones and immune responses.

It could be advisable to give more attention for the new developed strains, where they have better productive level than local strains with better immune ability than commercial hybrid strain.

Keywords: Laying strains, steroid hormones, immune responses, antibody titer

INTRODUCTION

In Egypt, new developed local strains could help towards improving productive and reproductive performance and increasing their profit. Body weight at onset of laying is an important factor for maximizing egg output. Increased body weight of laying hens is usually compound with increasing nutrients maintenance requirements that raising the cost of production and hinder the productive capacity (McDaniel *et al.*, 1981). While the problem with lighter body weight of breeding hens is to produce smaller eggs, which resulting in small pullet weight.

Egg production is associated with decreased rate of thyroid hormones turnover (Sharp and Klandorf, 1981), intensive metabolic activities (Leeson and Summers, 1990) and steroid hormones secretions (Etches, 1993).

Issiued by The Egyptian Society of Animal Production

Genetic differences among layer strains led to variation in egg production level which may be coincidentally accompanied by resistance to diseases or immunological response level (Afraz *et al.*, 1994).

For many years a few investigators have been studying the interrelationships among the immune system, the nervous system, the endocrine glands, the steroid hormones and psychological behavior. Wegmann and Gill (1983); Beuving *et al.* (1989) and Parmentier *et al.* (1993) concluded that increase blood serum glucocorticoids, androgens, estrogen and progesterone inhibit antibody production, whereas growth hormone, thyroxine and insulin enhance it. Antibody production is an important response in chicken defense against pathogens.

The present study was conducted to assess the relationships between steroid hormones level and immune responses of several laying strains with respect to their body size.

MATERIALS AND METHODS

One hundred and twenty six pullets of seven laying strains were used in this study. All pullets were at 20 weeks of age. Eighteen pullets from each of Fayoumi (F), Baladi (B), Gimmizah (G), Bandara (Ba), Golden Montaza (Mo), Rhode Island Red (RIR) and Lohman Selected Leghorn (LSL) were allocated in one battery line. Pullets of each strain were divided into two categories according to their body weight. Body weight categories were assigned as low and high. Average body weights (gm) for lighter pullets were (1187.7±91.5), (1275.5±66.5), (1507.7±111.4), (1584.4±85.6), (1462.2±87.0), (1513.3±116.4) and (1121.1±45.8); while for heavier pullets were (1474.4±117.4), (1760.7±132.0), (201.2±156.4), (2014.3±146.5), (1768.8±152.5), (1852.2±121.2) and (1327.7±48.4) for Fayoumi, Baladi, Gimmizah, Bandara, Golden Montaza, RIR and LSL pullets, respectively.

Nine pullets, within each body weight category of each strain, were subdivided randomly into three replicates each of three pullets. Pullets of each replicate were placed in one cage of 40 × 40 × 60 cm of length, width and height, respectively. The experiment was started during February with natural increase of day length and extended up to December (10 months). Pullets of Fayoumi and Baladi strains were received a diet of 13% crude protein and 2880 Kcal ME/Kg. While pullets of other strains received diet of 16% crude protein and 2918 Kcal ME/Kg. Both diets contained 3.6% calcium and 0.66% total phosphorous (NRC, 1994). Fresh and clean water and food were available *ad libitum* throughout the experimental period.

Experimental Procedure

Egg production was recorded from the first laid egg up to the tenth month of production. Age and body weight at sexual maturity were also recorded, feed intake was determined and feed conversion (feed: egg) was then calculated.

Blood Samples

Blood samples were collected from brachial vein of five birds from each body weight category within each strain. Blood was taken once at weeks 20, 30, 40, 50 and 60 of age. Blood samples (5 ml) were immediately centrifuged at 3000 rpm for 20 min. and then serum was stored at -20°C till analysis. Direct radioimmunoassay

(RIA) technique was performed to determine the serum hormones. Using ready antibody coated tube kits for chickens (Diagnostic Product Corporation, Los Angelos). Serum triiodothyronine (T_3), progesterone (P_4) and estradiol (E_2) were determined according to the procedure outlined by the manufacturer. The means of intra-assay coefficient of variations were 3.4%, 3.2% and 4.4% for T_3, P_4 and E_2, respectively.

Fresh blood samples (2ml) were used to determine total red blood cells (RBC s) count (X 10^6/mm^3) and total white blood cells (WBC's) count (X 10^3/mm^3) were immediately determined. Two drops of blood from each sample were smeared on two glass slides. The smears were stained within 2 to 3 hrs of preparation using May-Grunwald, Giemsa stains. One hundred leukocytes, including heterophils, lymphocytes, monocytes, basophils and eosinophils were counted on each slide and the H/L ratio was calculated by dividing the number of heterophils by that of lymphocytes. Both slides were counted and the mean H/L ratio was calculated for each bird.

Immunization and Titration

At 20, 39 and 59 weeks of age, five birds from each body weight category within each strain were injected intravenously in the brachial vein with 0.2ml of 10% suspension of packed sheep red blood cells (SRBC). Sera were collected every time on the seventh day postimmunization (at 21, 40 and 60 weeks) and antibody titer against SRBC was determined using the microtiter procedure described by Van der Zijpp and Leenstra (1980). Titers were expressed as the log 2 of the reciprocal of highest dilution giving complete agglutination.

Statistical Analysis

Data were statistically analyzed by the analysis of variance with the General Linear Model (GLM) procedure of the SAS Institute (SAS, 1992). All statements of significance are based on the 0.05 level of probability. Significant differences among body weight categories within strains were analyzed using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

1 - Productive performance

Obtained results of the productive performance for the seven strains with respect to body weight categories is presented in Table 1. Results revealed that LSL hens ($P<0.05$) maturated earlier, produced more and heavier eggs; and converted feed to egg better than other strains. While new developed strains (Gimmizah, Bandara and Golden Montaza) showed ($P<0.05$) better performance than each of Fayoumi and Baladi hens. These strain differences could mainly be due to the differences in their genetic background. Differences among strains in egg production performance were also observed by McDaniel *et al.* (1981) and Bayyari *et al.* (1997). Data showed that strains of Bandara, Gimmizah and Golden Montaza recorded subsequence gradually better productive performance.

Data in Table 1 indicated that low body weight within each strain recorded ($P<0.05$) earlier sexual maturity, and produced more eggs than high one with few exceptions. While hens of high body weight within each strain laid ($P < 0.05$) heavier

Table 1. Productive performance of the seven laying strains within body weight categories: L (low); H (high) and the SEM.

Items	Fayoumi		Baladi		Gimmizah		Bandara		Montaza		RIR		LSL		
	L	H	L	H	L	H	L	H	S	L	L	H	L	H	SEM
Sexual Maturity (days)	188^{a}	192^{a}	189^{a}	194^{a}	156^{d}	160^{d}	174^{c}	179^{b}	176^{b}	182^{b}	173^{c}	178^{b}	150^{e}	153^{e}	5
Weight of first egg (gm)	30.6^{f}	33.4^{e}	29.7^{f}	31.4^{e}	39.8^{d}	42.7^{b}	40.2^{c}	44.3^{b}	38.5^{d}	40.3^{c}	40.4^{c}	43.2^{b}	49.8^{a}	51.4^{a}	2.9
Days to produce first 10 eggs	17.4^{b}	18.2^{a}	18.4^{a}	19.1^{a}	13.2^{e}	13.9^{d}	14.4^{d}	15.8^{c}	13.4^{e}	14.8^{c}	14.2^{d}	15.9^{c}	11.4^{f}	11.9^{f}	0.7
Egg No. through 40 weeks	154^{d}	153^{d}	143^{d}	146^{d}	184^{b}	178^{b}	180^{b}	182^{b}	175^{c}	170^{c}	183^{b}	180^{b}	246^{a}	240^{a}	1.6
Egg wt. Through 40 weeks (gm)	38.6^{c}	40.2^{c}	36.4^{c}	38.2^{c}	42.2^{b}	45.3^{b}	43.2^{b}	47.8^{b}	42.3^{b}	44.9^{b}	43.8^{b}	47.3^{b}	53.7^{a}	57.4^{a}	0.8
Egg mass through 40 weeks (gm)	5945	6150	5205	5577	7765	8065	7776	8700	7402	7633	8015	8514	13210	13777	64
Feed intake (gm/hen/day)	104^{d}	118^{c}	100^{d}	120^{c}	112^{d}	123^{c}	121^{c}	134^{b}	127^{c}	138^{a}	130^{b}	142^{a}	119^{c}	132^{a}	5.31
Feed conversion (gm feed/gm eggs)	5.4^{a}	5.7^{a}	5.8^{a}	6.2^{a}	3.8^{c}	4.2^{b}	3.7^{c}	4.5^{b}	4.8^{b}	5.6^{a}	5.2^{a}	5.8^{a}	3.4^{c}	3.5^{c}	0.34

Values in the same row with different superscripts differ significantly ($P < 0.05$).

eggs than the low hens. Scheele (1988) showed that heavier hens produced heavier eggs and consumed more feed per dozen eggs.

2 - Blood serum hormones

Data in Table 2 show the blood serum concentration of triiodothyronine (T_3); progesterone (P_4) and estradiol (E_2) in the seven strains within the two-body weight categories. Obtained results showed gradual decrease of T_3 and increase of P_4 and E_2 by age till 50 weeks of age, while the concentrations of these hormones had inverse direction thereafter. Moreover, obtained data revealed that LSL hens recorded ($P < 0.05$) lower serum T_3 and ($P < 0.05$) higher serum P_4 and E_2 than other strains. While Fayoumi and Baladi hens recorded the ($P < 0.05$) hgiher level of T_3 and ($P < 0.05$) lower level of P_4 and E_2 in their blood serum than other strains.

Data indicated that the advancement of hen production stage is associated with a decrease in serum T_3 which may be due to the negative relationship between thyroid function (i.e. T_3) and gonadal steroid hormones (egg production level). In the current study, the LSL's, as high producing hens, showed greater decrease in T_3 and greater increase in P_4 and E_2. These results are in good agreement with those observed by Sharp and Klandorf (1981). They attributed the decrease in T_3 to the inverse relationship between gonadal steroid hormones and thyroid function.

According to body weight, it is clear that egg production level is largely controlled by serum hormone concentration, which in turn controlled by body size. All of these characters are mainly dependent on genetic make up, of the bird.

3 - Blood picture

Data in Table 3 show the total red blood cell (RBC's) count, total white blood cell count (WBC s) and heterophil/lymphocytes (H/L) ratio for the seven strains with respect to their body weight.

Total red blood cells (RBC's) count showed ($P < 0.05$) higher values in Fayoumi and Baladi hens than others. While LSL recorded ($P < 0.05$) the lowest values of RBC s. These observations are mainly related to the egg production level. However, the production progress required oxygen and metabolisable nutrients more in high production case than less production one. Freeman (1971) and Maxwell and Robertson (1995) suggested that the stage of production was the apparent factor, which contributed to the significant higher count of RBC s in the young versus that in the adult birds. These observations are confirming the present findings in which the RBC 's count was shown to be decreased by advancement of age (stage of production). While the rather observed increase at the end of laying period in RBC's count may be due to the decreased rate of egg production and decreases of P_4 and E_2 concentrations. Sturkie (1986) came to similar observations.

Total white blood cells (WBC's) count showed similar trend of RBC's. Increased total WBC s in Fayoumi and Baladi hens than others and the lowest recorded level of WBC s in LSL samples. This could be due to a subtle redistribution of lymphoid tissue in high production birds that may be reflected on the immune responses. Yamamoto and Okada (1990), Afraz *et al.* (1994) and Bayyari *et al.* (1997) suggested that immune response of chickens had a significant variation among birds of different genetic lineages, many of these functions are highly heritable and are often negatively correlated with body weight.

Table 2. Least squares means of serum triiodothyronine (T_3), progesterone (P_4) and estradiol (E_2) for the seven laying strains with respect to body weight categories: L (low); H (high) and the SEM:

Hormone concentration	Age (wk)	Laying hen strains: Fayoumi L	Fayoumi H	Baladi L	Baladi H	Gimmizah L	Gimmizah H	Bandara L	Bandara H	Montaza L	Montaza H	RIR L	RIR H	LSL L	LSL H	SEM
T_3 (ng/ml)	20	3.8^{a}	3.9^{a}	3.7^{a}	3.9^{a}	2.9^{b}	2.8^{b}	2.7^{b}	2.8^{b}	2.6^{b}	2.8^{b}	2.6^{b}	2.8^{b}	2.5^{c}	2.3^{c}	0.5
	30	3.4^{a}	3.3^{a}	3.5^{a}	3.4^{a}	2.4^{bc}	2.5^{b}	2.5^{b}	2.6^{b}	2.4^{bc}	2.3^{c}	2.5^{b}	2.3^{c}	1.8^{d}	1.7^{d}	0.5
	40	2.8^{a}	2.7^{a}	2.5^{a}	2.4^{b}	2.3^{b}	2.2^{c}	2.3^{b}	2.4^{b}	2.0^{c}	2.2^{c}	2.3^{b}	2.4^{b}	1.5^{d}	1.4^{d}	0.4
	50	2.2^{a}	2.2^{a}	2.3^{a}	2.2^{a}	1.7^{b}	1.8^{b}	1.8^{b}	1.7^{b}	1.8^{b}	1.8^{b}	1.7^{b}	1.8^{b}	1.3^{c}	1.2^{c}	0.4
	60	2.2^{a}	2.1^{a}	2.1^{a}	2.1^{a}	1.7^{b}	1.9^{b}	1.3^{c}	1.3^{c}	1.2^{d}	1.1^{d}	1.4^{c}	1.3^{c}	1.2^{d}	1.2^{d}	0.3
P_4 (ng/ml)	20	0.089^{c}	0.090^{c}	0.080^{c}	0.079^{c}	0.104^{b}	0.107^{b}	0.108^{b}	0.104^{b}	0.106^{b}	0.107^{b}	0.102^{b}	0.107^{b}	0.129^{a}	0.130^{a}	0.02
	30	0.104^{c}	0.100^{c}	0.107^{c}	0.102^{b}	0.123^{b}	0.120^{b}	0.120^{b}	0.116^{b}	0.127^{b}	0.126^{b}	0.118^{b}	0.119^{b}	0.164^{a}	0.170^{a}	0.02
	40	0.115^{c}	0.119^{c}	0.116^{c}	0.118^{c}	0.134^{b}	0.133^{b}	0.133^{b}	0.139^{b}	0.133^{b}	0.137^{b}	0.127^{b}	0.134^{b}	0.192^{a}	0.194^{a}	0.02
	50	0.121^{c}	0.124^{c}	0.123^{c}	0.126^{c}	0.150^{b}	0.145^{b}	0.150^{b}	0.147^{b}	0.148^{b}	0.150^{b}	0.137^{b} c	0.147^{b}	0.190^{a}	0.195^{a}	0.03
	60	0.122^{c}	0.123^{c}	0.119^{c}	0.120^{c}	0.152^{b}	0.149^{b}	0.155^{b}	0.152^{b}	0.150^{b}	0.152^{b}	0.148^{b}	0.150^{b}	0.189^{a}	0.190^{a}	0.03
E_2 (pg/ml)	20	32.7^{c}	33.5^{c}	32.4^{c}	34.4^{c}	37.3^{b}	36.7^{b}	38.3^{b}	37.8^{b}	38.2^{b}	37.6^{b}	38.6^{b}	38.5^{b}	45.8^{a}	43.4^{a}	3.2
	30	36.4^{c}	37.5^{c}	36.8^{c}	35.7^{c}	39.6^{b}	38.4^{b}	40.3^{b}	39.8^{b}	39.4^{b}	38.8^{b}	40.4^{b}	40.7^{b}	63.4^{a}	60.2^{a}	3.4
	40	39.6^{c}	40.7^{c}	39.3^{c}	39.4^{c}	40.4^{b}	40.5^{b}	41.6^{b}	41.6^{b}	41.5^{b}	40.4^{b}	41.6^{b}	41.5^{b}	70.1^{a}	68.4^{a}	2.8
	50	40.5^{c}	40.4^{c}	40.5^{c}	40.6^{c}	42.8^{b}	42.6^{b}	41.8^{b}	41.4^{b}	42.8^{b}	42.6^{b}	41.7^{b}	41.8^{b}	75.2^{a}	74.2^{a}	2.9
	60	40.6^{c}	40.8^{c}	40.7^{c}	41.4^{c}	42.3^{b}	42.7^{b}	42.8^{b}	42.7^{b}	42.7^{b}	42.4^{b}	42.3^{b}	42.7^{b}	73.2^{a}	73.5^{a}	2.4

Values in the same row with different superscripts differ significantly ($P < 0.05$).

Obtained data concerning H/L ratio confirmed the influence of lymphocytes in the total WBC's count. While decreased values of H/L mean an increase of the lymphocytes. Consistent with the previous findings, adrenocortical activation is known to precede lymphocytosis (Beuving *et al.*, 1989). Interestingly enough, H/L ratios continued to rise with progressively egg production, which might be due to the involvement of hypothalamic hypophyseal-adrenocortical axis.

4 - Antibody titer

The immunity induced by immunization or infection is called active acquired immunity (Gordon and Jordan, 1982). The significant variation on antibody titer against SRBC among different strains is presented in Table 3 and partially consistent with the results of Van der Zijpp (1983), who reported significant differences in antibody titer of SRBC among cockerels of three genetic origins (White Plymoth Rock, White Leghorn and Warren). Obtained data herein indicate significant higher values of antibody titer for Fayoumi and Baladi hens than other strains, and LSL hens recorded ($P < 0.05$) the lowest values. The results of the present study are consistent with those of Inooka *et al.* (1984). Who found that antibody producing ability (to disease antigens or to nondisease antigens such as SRBC) was influenced by genetic factor. These facts suggest that sort of genetic regulation for antibody production is involved in general antibody production and resistance, namely common genetic control system, exists among mechanisms in disease resistance and antibody production (Inooka *et al.*, 1984).

On the other hand, specific defects in the immune response may actually enhance performance, as immune stimulation has been shown to have a negative effect on productivity (Bayyari *et al.*, 1997). Furthermore, obtained results are in good agreement with those observed by Parmentier *et al.* (1993).

It could be concluded that Fayoumi and Baladi hens had higher immune responses accompanied with lower productive performance than others. LSL hens showed superior status of productive performance but less immune ability. While new developed strains (Gimmizah, Bandara and Golden Montaza) had an intermediate position in both immune responses and productive performance.

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Table 3. Least squares means of total red blood cells (RBCs), total white blood cells (WBCs) heterophil/lymphocyte ratio (H/L) and antibody titer against (SRBC) for the seven laying strains with respect to body weight, L (low); H (high) and the SEM:

Item	Age (wk)	Laying hen strains														SEM
		Fayoumi		Baladi		Gimmizah		Bandara		Montaza		RIR		LSL		
		L	H	L	H	L	H	L	H	L	H	L	H	L	H	
Total	20	4.3^{a}	4.3^{a}	4.2^{a}	4.2^{a}	2.9^{b}	2.8^{b}	$2,9^{b}$	2.8^{b}	2.6^{b}	2.7^{b}	2.8^{b}	2.9^{b}	2.3^{c}	2.4^{c}	0.07
RBCs	30	3.9^{a}	3.8^{a}	3.9^{a}	3.9^{a}	2.9^{b}	2.6^{b}	2.6^{b}	2.8^{b}	2.9^{b}	2.8^{b}	2.6^{b}	2.6^{b}	1.8^{c}	1.9^{c}	0.07
($X10^{6}$/	40	2.8^{a}	2.9^{a}	2.6^{a}	2.4^{a}	2.3^{ab}	2.3^{b}	2.4^{ab}	2.6^{a}	2.6^{b}	2.4^{b}	2.6^{ab}	2.5^{b}	1.9^{c}	1.7^{c}	0.05
mm^{3})	50	2.4^{a}	2.3^{a}	2.3^{a}	2.3^{a}	1.9^{b}	1.8^{b}	1.8^{b}	1.9^{b}	1.8^{b}	1.9^{b}	1.9^{b}	1.9^{b}	1.5^{c}	1.5^{c}	0.05
	60	2.8^{a}	2.8^{a}	2.9^{a}	2.9^{a}	2.7^{b}	2.9^{b}	2.8^{c}	2.8^{c}	2.8^{c}	2.7^{c}	2.7^{c}	2.8^{c}	1.2^{d}	1.3^{d}	0.04
Total	20	25.6^{a}	25.0^{a}	24.8^{a}	25.0^{a}	23.7^{b}	23.0^{b}	23.0^{b}	22.9^{b}	23.1^{b}	23.2^{b}	23.6^{b}	23.5^{b}	20.5^{c}	201^{c}	13
WBCs	30	23.4^{a}	23.7^{a}	24.0^{a}	23.8^{a}	23.1^{b}	23.2^{b}	23.0^{b}	22.3^{b}	22.1^{b}	22.1^{b}	22.4^{b}	22.2^{b}	19.7^{c}	19.8^{c}	19
($X10^{3}$/	40	21.9^{a}	22.3^{a}	22.1^{a}	22.7^{a}	21.4^{b}	21.6^{a}	22.8^{a}	21.1^{b}	21.0^{b}	20.8^{b}	21.4^{b}	21.6^{b}	19.8^{c}	19.6^{c}	18
Mm^{3})	50	20.1^{a}	20.5^{a}	20.8^{a}	21.0^{a}	20.9^{a}	20.0^{b}	21.4^{a}	21.0^{a}	20.0^{b}	20.1^{b}	20.4^{b}	20.5^{b}	19.2^{c}	19.4^{c}	31
	60	21.9^{a}	21.8^{a}	21.8^{a}	21.8^{a}	20.7^{b}	21.0^{b}	21.0^{b}	21.0^{b}	18.5^{c}	19.5^{c}	20.7^{b}	20.7^{b}	18.0^{c}	18.5^{c}	30
H/L ratio	20	0.37^{d}	0.38^{d}	0.36^{d}	0.38^{d}	0.42^{c}	0.43^{c}	0.44^{c}	0.45^{c}	0.53^{b}	0.54^{b}	0.55^{b}	0.56^{b}	0.64^{a}	0.65^{a}	0.05
	30	0.38^{d}	0.39^{d}	0.40^{d}	0.41^{cd}	0.44^{c}	0.45^{c}	0.42^{c}	0.43^{c}	0.52^{b}	0.49^{b}	0.56^{b}	0.54^{b}	0.63^{a}	0.65^{a}	0.05
	40	0.40^{c}	0.42^{c}	0.45^{bc}	0.43^{c}	0.46^{bc}	0.46^{bc}	0.48^{bc}	0.49^{bc}	0.48^{bc}	0.52^{b}	0.53^{b}	0.55^{b}	0.67^{a}	0.69^{a}	0.35
	50	0.46^{d}	0.48^{d}	0.46^{d}	0.49^{d}	0.55^{c}	0.57^{c}	0.52^{c}	0.54^{c}	0.52^{c}	0.53^{c}	0.64^{b}	0.62^{b}	0.78^{a}	0.74^{a}	0.39
	60	0.51^{d}	0.52^{d}	0.52^{d}	0.53^{cd}	0.56^{c}	0.54^{c}	0.58^{c}	0.57^{c}	0.57^{c}	0.56^{c}	0.66^{b}	0.70^{a}	0.77^{a}	0.75^{a}	0.39
Antibody	21	7.4^{a}	7.5^{a}	7.1^{a}	7.2^{a}	5.4^{b}	5.3^{b}	5.4^{b}	5.2^{b}	5.4^{b}	5.2^{b}	3.7^{c}	3.7^{c}	3.2^{d}	3.4^{d}	0.31
titer	40	6.7^{a}	6.8^{a}	6.4^{a}	6.6^{a}	4.6^{b}	4.7^{b}	4.7^{b}	4.5^{b}	4.6^{b}	4.4^{b}	2.9^{c}	2.6^{c}	2.3^{d}	2.2^{d}	0.20
	60	4.2^{a}	4.6^{a}	5.7^{a}	5.8^{a}	3.3^{b}	3.8^{b}	3.8^{b}	4.0^{b}	3.8^{b}	3.7^{b}	2.4^{c}	2.5^{c}	2.1^{d}	2.2^{d}	0.18

Values in the same row with different superscripts differ significantly ($P < 0.05$).

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تقييم لبعض الاختلافات المناعية والهرمونية لبعض سلالات الدجاج البياض

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قسم الإنتاج الحيوانى – كلية الزراعة – جامعة المنيا – جمهورية مصر العربية

استخدم فى هذه الدراسة عدد سبعة سلالات من الدجاج هى الفيومى، البلدى، جميزة، بندرة، منتزه الذهبي، الرود ايلند الأحمر و اللهمان لجهورن المنتخب (LSL). من كل سلالة استخدم عدد ١٨ دجاجة عمر ٢٠ أسبوع. قسمت الدجاجات داخل كل سلاله حسب وزن الجسم إلى مجموعتين: مجموعة ذات وزن صغير، مجموعة ذات وزن كبير.

احتوت كل مجموعة وزن على ٩ دجاجات، قسمت الـ ٩ دجاجات إلى ٣ مكررات. تم تسكين دجاجات كل مكررة فى قفص. غذيت الدجاجات على عليقه بها ١٣% بروتين خام، ٢٨٨٠ كيلو كالورى طاقة ممثلة/كجم بالنسبة للفيومى والبلدى بينما باقى السلالات غذيت على عليقه بها ١٦% بروتين خام، ٢٩١٨ كيلو كالورى طاقة ممثلة/كجم. استمرت التجربة حتى عمر ٦٠ أسبوع.

أوضحت النتائج أن دجاجات الفيومى والبلدى حققت أقل القياسات الإنتاجية (عمر النضج الجنسى، وزن البيض، عدد البيض وكفاءة التحويل الغذائى) بينما دجاجات الـ LSL حققت أفضل النتائج الإنتاجية بينما السلالات المستحدثة حققت مركز متوسط فى الصفات الإنتاجية.

كذلك كان لوزن الجسم تأثيرا معنويا على وزن البيض (الوزن الكبير يعطى بيض أكبر فى الوزن من الدجاجات الصغيرة الحجم). بينما باقى الاختلافات فى الصفات الإنتاجية لم تكن معنوية.

أوضحت النتائج أيضاً أن هرمون الـ T_3 يقل بزيادة الإنتاج بينما يزيد مستوى كل من P_4 ، E_2 بزيادة الإنتاج. ولم يكن لوزن الجسم أي تأثير على مستوى هرمونات سيرم الدم.

كذلك أوضحت النتائج أن كلا من عدد كرات الدم الحمراء، البيضاء الكلى ومستوى الأجسام المناعية فى سيرم الدم تتناسب عكسيا مع مستوى إنتاج البيض بين السلالات المختلفة. بينما تتناسب نسبة H/L تناسبا طردياً مع مستوى الإنتاج.

يتضح من تلك النتائج أن وزن الجسم داخل السلالة له تأثير إيجابى على وزن البيض فقط. وأن مستوى إنتاج البيض يتناسب طردياً مع مستوى الهرمونات الجنسية وعكسيا مع الاستجابات المناعية.

من هذه النتائج يمكن أن ينصح باستخدام السلالات المستحدثة فى إنتاج البيض مع استمرار عمليات الانتخاب بها حتى تحافظ على مستوى الانتاج. هذا لما لها من قدرة على الاستجابة المناعية أعلى من دجاجات الـ LSL.