

Crossbreeding Effect on Some Biochemical Parameters of Blood and Egg Production Traits in Iraqi Hens during the Laying Period

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Abstract:

A research was carried out to evaluate the egg production traits of 100 main and reciprocal crossbred Isa Brown and normal local Iraqi chickens. Egg production data were collected on 800 eggs for 100 days and a subject of randomized two-way analysis of variance complete block design. Results indicated that Isa Brown x Iraqi hens recorded highest significant ($P < 0.05$) Serum melatonin hormone (205.6 ± 9.973 pg/ml) serum Calcium (8.91 ± 0.254 mg/dl), serum Phosphor (4.62 ± 0.186 mg/dl), serum Magnesium (3.94 ± 0.216 mg/dl), weight at first egg (40.72 ± 0.927 g.), body weight at first egg (1459 ± 26.7 g), Age maturity (153.15 ± 0.607 day) and total egg number to 100 days (68.68 ± 2.047 eggs) while Iraqi hens recorded highest significant ($P < 0.05$) Serum melatonin hormone (102.99 ± 9.341 pg/ml) serum Calcium (7.64 ± 0.333 mg/dl), serum Phosphor (5.78 ± 0.673 mg/dl), serum Magnesium (3.12 ± 0.11 mg/dl), weight at first egg (32.78 ± 0.412 g.), body weight at first egg (1367 ± 19.3 g), Age at first egg (141.48 ± 2.207 day) and total egg number to 100 days (50.27 ± 1.575 eggs).

Keywords: Crossbreeding, hybrid chickens, egg production traits, melatonin, calcium, phosphor, magnesium, local chicken, Iraqi chicken, egg number, first egg weight, body weight at first egg,

Introduction

Iraqi Chickens are known to have beneficial qualities such as disease resistance but the key issue with native chickens in the tropics is that they are poor egg and meat producers. (Al-Rawi, 2006), but even if they show low productivity, are well suited to the tropics, are immune to poor management and feed shortages, and can tolerate a variety of diseases and parasites. (Momoh et al., 2010). On the other side, the situation has changed layer and broiler chicken breeds produce more eggs and meat than native chicken breeds, but the tropical climate poses a significant challenge (Oleforuh-Okoleh, 2016). They aren't accustomed to harsh environmental conditions like high temperatures, illness, or a lack of food (Assefa et al., 2018). The core biological clock mechanism in avian species is much more complex, as it includes the avian counterpart of the mammalian SCN, as well as the photosensitive pineal gland and the retina (ÇALIŞLAR et al., 2018; Hassanzadeh et al., 2016); but the importance of particular components varies between species. Melatonin serves a variety of physiological roles in the body, including influencing food intake, metabolic processes, and immune responses (Prusik et al., 2015). After a melatonin injection, samples were taken from the brachial vein and total white blood cell (WBC) counts, differential cell counts, and T and B lymphocyte activities were checked. The dosage of melatonin or the time of injection had no effect on body weight (Bermudez et al., 1983). Besides

that, melatonin had no effect on FC; however, FC was substantially lower in the dark-injected group compared to the light-injected group. BW was significantly higher. These findings suggest that melatonin has a significant role in enhancing not only circulating WBC but also the activities of B and T lymphocytes in immature male chickens without influencing BW (Li *et al.*, 2017). Indigenous stock crossbreeding with exotic commercial birds would benefit from artificial productivity selection of exotical birds, as well as from natural selection for resistance in indigenous birds (Munisi*et al.*, 2015). Crossbreeding may result in birds with improved growth rates, feed conversion ability, and reproductive traits without sacrificing local adaptation, resulting in lower production costs (Adebambo *et al.*, 2011). It would be more appreciable to suggest cross-breeding programs, including upgrading local chickens with appropriate exotic resources (Khawaja *et al.*, 2013). So, the aim of this study will be to develop a new hybrid that is resistant to harsh tropical conditions whilst also producing a sufficient amount of egg and meat.

METHODS

Experimental location

study was carried out on 120 Iraqi flock of chickens raised on a test farm in Ministry of Science and Technology\Center for Livestock and Fisheries Department of Poultry (Bagdad\Zaafranjh), where all hens before and after crossing Individual cages were used for each animal. The hens were mated with male Iraqi chickens at a ratio of 1 cock: 10 hens when they were laying eggs (30-50 weeks old).

Experimental stock and management

The parent stock used consisted of 60 exotic Isa Brown (10 cocks and 50 hens and 60 normal local Iraqi chickens (10 cocks and 50 hens) chickens. These were fed layer mash containing 2650 metabolizable energy per kilogram weight (ME/kg) and 16.5 % crude protein (CP) ad libitum and mated in main and reciprocal order to produce fertile eggs which were set in locally constructed incubator in batches at weekly intervals. The birds were produced in twelve consecutive hatches. F1 crossbreds produced were normal local Iraqi chickens x Isa Brown. The F1 birds were fed during starting, growing and laying stages with recommended diets containing 2800 kcal ME/kg and 20% CP, 2550 kcal ME/kg and 15% CP and 2650 ME/kg and 16.5 % CP, respectively.

Parameters measured

Serum [melatonin hormone (pg/ml), Calcium (mg/dl), Phosphor (mg/dl), Magnesium (mg/dl)]. Weight of first egg (WTFE) was measured as the weight of first egg of a hen. The age of the first egg (AFE) was counted as a count of days it took a hen to lay its first egg. The first egg's body weight (BWFE) was calculated in gram (g) , the weight of body attained by a hen at first egg. Total egg number to 100 days (EN100) was counted as the number of eggs laid in the first 100 days after maturity of a hen

statistical analysis

Results were analyzed statistically by following complement Randomize Design (CRD), values calculated by the Statistical Package for the Social Sciences (SPSS) software / version 24. where data were expressed as the Means, Standard Error, one-way ANOVA, independent-sample T Test, were used to find the association between the categorical variables, P value ($p < 0.05$) was determined to be statistically important.

Results

As seen in Table 1, differed significantly ($P < 0.05$) in all the traits except for serum Phosphor. The results at Iraqi hens recorded highest significant ($P < 0.05$) Serum melatonin hormone (102.99 ± 9.341 pg/ml) serum Calcium (7.64 ± 0.333 mg/dl), serum Phosphor (5.78 ± 0.673 mg/dl), serum Magnesium (3.12 ± 0.11 mg/dl), weight at first egg (32.78 ± 0.412 g.), body weight at first egg (1367 ± 19.3 g), Age at first egg (141.48 ± 2.207 day) and total egg number to 100 days (50.27 ± 1.575 eggs) while Results indicated that Isa Brown x Iraqi hens recorded highest significant ($P < 0.05$) Serum melatonin hormone (205.6 ± 9.973 pg/ml) serum Calcium (8.91 ± 0.254 mg/dl), serum Phosphor (4.62 ± 0.186 mg/dl), serum Magnesium (3.94 ± 0.216 mg/dl), weight at first egg (40.72 ± 0.927 g.), body weight at first egg (1459 ± 26.7 g), Age maturity (153.15 ± 0.607 day) and total egg number to 100 days (68.68 ± 2.047 eggs).

Table (1) Comparison local Iraqi chickens before and after crossbreeding for ML, Ca, P, Mg, FEW, AFE, BWFE and EN parameters.

| parameter | unit | before crossbreeding | after crossbreeding | P |
|-------------------|--------|----------------------|---------------------|-------|
| Melatonin Hormone | pg./ml | 102.99±9.341 | 205.6±9.973 | 0.000 |
| Calcium | mg/dl | 7.64±0.333 | 8.91±0.254 | 0.003 |
| Phosphor | mg/dl | 5.78±0.673 | 4.62±0.186 | 0.105 |
| Magnesium | mg/dl | 3.12±0.11 | 3.94±0.216 | 0.002 |
| FEW | gm. | 32.78±0.412 | 40.72±0.927 | 0.000 |
| BWFE | gm. | 1367±19.3 | 1459±26.7 | 0.006 |
| AFE | day | 141.48±2.207 | 153.15±0.607 | 0.000 |
| EN | egg | 50.27±1.575 | 68.68±2.047 | 0.000 |

Discussion

Melatonin, increase hens' egg laying productivity. Higher serum melatonin levels in hens associated with more egg production like we saw in (table 1), increasing encouraged oocyte maturation and growth (Mosleh *et al.*, 2016). The egg-laying rate was positively correlated with blood melatonin levels, according to a few studies on the effects of melatonin application on the yield of egg development in hens (Li *et al.*, 2017). Melatonin implantation at a dosage of 10 mg also increased their egg-laying rate significantly. As well as an improvement in the rate of laying, the overall egg weight and the consistency of the eggs have been increased (Jia *et al.*, 2016). The results found there was a significant increase in the concentration of melatonin hormone. The continued annual productivity gains of commercial Layer flocks were a reflection of the complex and coordinated approach adopted by breeders to maximize performance (Mrode, 2014). Breeders have selected for such traits as growth rate, heart and lung function, and livability. This had considerable positive effects on bird welfare, as well as on the environmental impact of production (Riber *et al.*, 2018), so the results here reflect that approach by raised the studied traits of two flocks and this had profound positive impacts on the environment and on the availability of poultry quantity and quality egg to the human population (Liu *et al.*, 2020). The large change in some physiological parameters among bird species possibly due to circadian rhythms, dietary impact, gender, and age (Eren *et al.*, 2006). Like assumed in the study, the rising in phosphor and magnesium level increased biosynthesis and accumulation in the egg yolk

were the causes (Jacob and Pescatore, 2013). Increased calcium release into the blood of laying hens is closely associated with their accumulation in the shell, while enhanced calcium and phosphorus could be seen in females as in the most avian species in the breeding season although the calcium phosphorus ratios were unaffected Increased (Hrabčáková *et al.*, 2014)so there was a significant difference ($p<0.05$) for the flock after crossbreeding for all studied parameters, which implies hybridization success significantly for all parameters were studied.

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