

## SOME PHYSIOLOGICAL PARAMETER FOR THE FIRST GENERATION RESULTING FROM CROSS-BREEDING LOHMANN CLASSIC CHICKENS WITH TWO STRAINS OF IRAQI LOCAL ROOSTERS

Khaleel A. A. Shanaw<sup>1</sup> and Qutaiba J. Ghani<sup>2</sup>

<sup>1</sup>Ministry of Agriculture, Directorate of Agriculture, Basra, Iraq.

<sup>2</sup>Department of Animal Production Science, Faculty of Agriculture, University of Basra, Iraq.

e-mail : mutalsem@gmail.com, qutiba.chemi@uobasrah.edu.iq

(Received 2 July 2021, Revised 31 August 2021, Accepted 8 September 2021)

**ABSTRACT :** The study was conducted in the poultry field of the Agricultural Advisory Office and the laboratories of the Department of Animal Production, University of Basra, College of Agriculture, Karmat Ali site, Basra with the aim of evaluating hatching traits and the effect of crossing WN x L and BR x L between males of two breeds of local white naked neck (WN) and brown (BR) chickens with Lohmann Classic layer (L) females, on age, weight at sexual maturity, blood cell characteristics of the first generation, The results showed a significant superiority ( $P \leq 0.05$ ) of the WN x L cross in the fertility rate, which amounted to 90.00%, compared with BR x L, which amounted to 85.33%, and The hatchability percentage of total eggs %, as WN x L outperformed in achieving the highest hatchability rate of total eggs, which amounted to 84.00%, compared with BR x L, which recorded 76.00%. While no significant differences were recorded in the percentage of hatching of fertilized eggs, embryonic mortality and the percentage of deformed chicks, ( $P \leq 0.05$ ) Birds obtained from crossbreeding WN x L outperformed in age at sexual maturity, which reached 154 and 157 days for males and females, compared with the crosses obtained by cross breeding BR x L, which reached 161 and 165 days, Whereas the latter outperformed ( $P \leq 0.05$ ) in the average body weight at maturity, which reached 2106 and 1801.33 g for males and females, compared with the birds obtained from crossbreeding WN x L, which reached 1831.6 and 1684 gm, Males recorded a significant increase ( $P \leq 0.05$ ) in PCV, Hb, RBC and WBC rates compared to females.

**Key words :** Crossbreeding, local Iraqi chicken, sexual maturity, hatchability, blood characteristics, naked neck chicken.

**How to cite :** Khaleel A. A. Shanaw and Qutaiba J. Ghani (2022) Some physiological parameter for the first generation resulting from cross-breeding Lohmann Classic chickens with two strains of Iraqi local roosters. *Biochem. Cell. Arch.* **22**, 2893-2897. DocID: <https://connectjournals.com/03896.2022.22.2893>

### INTRODUCTION

All countries in the world are seeking to establish local chicken flocks to enable rural residents and farmers to rely on their protein products represented by eggs and meat (Kejela, 2020). Domestic chickens make up about 80% of the flocks of chickens that feed low-income farmers in most countries, especially Asian and African (Alameri *et al*, 2019). The Iraqi local chickens are quick to adapt to the semi-tropical climate in Iraq when compared with commercial breeds, as they can adapt to enjoy good resistance to heat stress, in addition to that, their immunity level is high, which shows good resistance to diseases as well as genetic diversity and polymorphism with the multiplicity of geographical areas in which it settles, except it suffers from slow growth and low egg production as a result of internal breeding (AL-Anbari, 2020). Which encourages its use in Breeding and

improvement programs to optimize its productive and physiological performance to preserve it as Iraq's important national treasure (AL-Anbari, 2019). As conducting crossbreeding operations between local chickens with commercial breeds that enjoy abundant egg production, as well as a large structure that enables them to produce meat, aims to combine the characteristics of both breeds (Pagala *et al*, 2020). The study aims to cross two breeds of Iraqi local chickens with females of the commercial Lohmann breed, study the characteristics of hatching and fertility and make a comparison for the first generation in terms of age, weight at sexual maturity and some blood characteristics.

### MATERIALS AND METHODS

The study was conducted in the poultry field of the Agricultural Advisory Office and the laboratories of the

**Table 3 :** Effect of crossbreeding between male local chickens and commercial Lohmann females on blood cellular characteristics at the age of sexual maturity for the first generation (mean  $\pm$  standard deviation).

Genetic groups	WN x L		BR x L	
PCV (%)	34.00 $\pm$ 1.0a	31.00 $\pm$ 1.1b	35.00 $\pm$ 1.00a	32.00 $\pm$ 1.00b
Hb (g/dl)	11.23 $\pm$ 0.21b	10.10 $\pm$ 0.10c	11.77 $\pm$ 0.21a	10.37 $\pm$ 0.32c
RBC ( $\times 10^6$ )	3.40 $\pm$ 0.01b	2.93 $\pm$ 0.02 c	3.45 $\pm$ 0.02a	2.95 $\pm$ 0.03c
WBC ( $\times 10^3$ )	29.13 $\pm$ 0.82a	28.40 $\pm$ 0.64b	29.02 $\pm$ 0.32a	27.62 $\pm$ 0.53b

females.

It appears from the table that there is a significant difference between males in the rates of hemoglobin concentration and RBC count, as BR x L males recorded a significant increase ( $P \leq 0.05$ ) with an average hemoglobin concentration of 11.77 and RBC that amounted to 3.45 compared with WN x L males that reached 11.23 and 3.40. The reason for the superiority of BR x L may be attributed to the difference in the genotype, as the genotype with natural feathers is significantly superior in hemoglobin concentrations compared with naked neck genotype (Peters *et al*, 2011). While, the males in each group recorded a significant increase ( $P \leq 0.05$ ) in hemoglobin concentrations and RBC count compared to females. The reason maybe attributed to the secretion of androgens in males, which leads to an increase in the number of red blood cells, which causes an increase in hemoglobin concentration, because there is a direct relationship between the number of red blood cells and hemoglobin concentration (Lin *et al*, 2020). The reason for the low numbers of red blood cells in females may be due to the effect of estrogen and this is what Khan (2005) found in its results when broilers were injected with estrogen. These results are in agreement with Addass *et al* (2012), which showed that males were significantly superior in hemoglobin concentration rates compared to females. The results of this study came close to the findings of Medihin *et al* (2018), who showed that hemoglobin concentration rates in males ranged from 9.14-10.32 and in females ranged from 9.10-9.66 when studying the cellular blood characteristics of Ethiopian local chickens.

The results indicate that there is no significant difference between the two hybrids in the rates of WBC, while there is a significant superiority ( $P \leq 0.05$ ) for males resulting from crossing WNxL and BRxL in WBC at the age of sexual maturity, which amounted to 29.13 and 29.02 compared to females, which amounted to 28.40 and 27.62, respectively. The results were in agreement with the findings of Isidahomen and Njidda (2012), who showed in their study on the local naked neck chicken breed and the curly and naturally feathered breed that males were significantly superior in the WBC count compared to

females, as they found the WBC count 28.5 and 24.88  $10^3 / \text{mm}^3$  for males and females, respectively, at the age of sexual maturity. Moreover, agreed with Kundu *et al* (2013), which showed in his study of the hybrid produced by crossing the males of the Black Nicobari breed with the females of the local Vanaraja breed in India, a significant superiority of the males in the number of white blood cells compared to the females. The results of the study were in agreement with Ahemen *et al* (2018), which found a significant superiority of males in the rates of white blood cell count compared to females when studying the effect of gender and strain on the cellular blood characteristics of broiler chickens. While the results of this study did not agree with what was found by Naveen *et al* (2019), which showed that the rates of white blood cell counts did not differ significantly between males and females, which amounted to 27.63 and 26.81, respectively, when studied on males and females of the Indian local Rajasri breed.

## CONCLUSION

Males of the local bare-necked white breed are characterized by a higher fertility rate than the brown males. The eggs produced by crossing naked white males with Lohmann females have a higher rate of hatching than the eggs produced by crossing local brown males with Lohmann females, Crossing the local bare-necked white males with the white commercial Lohmann females resulted in the production of hybrids characterized by an early sexual maturity compared with the crosses resulting from crossing brown males with Lohmann females, which were characterized by a higher body weight at the age of sexual maturity.

## REFERENCES

- Addass P A, David D L, Edward A, Zira K E and Midau A (2012) Effect of age, sex and management system on some haematological parameters of intensively and semi intensively kept chicken in Mubi, Adamawa State, Nigeria. *Iranian J. Appl. Anim. Sci.* **2**(3), 277-282.
- Ahemen T, Ukwu H O and Anongo T T (2018) ABG-39 Sex and Strain Effects on Hematology Parameters of Broiler Chickens at Makurdi. *Interaction* **19**(1.26), 20-17.
- Alameri M M, Al-anbari E H and Razuki W M (2019) Association the Neuropeptides Y (NPY) gene polymorphisms with egg production traits in Iraqi local brown chicken. *Biochem. Cell.*

- Arch.* **19**(1), 1381-1388.
- AL-Anbari E H (2019) Comparison of some genetic parameters and economic traits of Iraqi local chicken with other breeds. *J. Res. Ecol.* **7**(2), 2582-2596.
- AL-Anbari E H (2020) Association of coat plumage colors (CPC) for Iraqi local chicken and some productive performance trait by using some analysis parameters. *Ann Trop Med Public Heal.* **23**(06), 88-94.
- Al-Rawi A A and Al-Athari A K (2002) Characteristics of indigenous chickens in Iraq. *Animal Genetic Resources Information* **32**, 87-94.
- Amao S R (2017) Egg production and growth performance of naked Neck and Rhode Island Red chickens crosses under Southern Guinea Savanna condition of Nigeria. *Int. J. Agricult. Earth Sci.* **3**(2), 1-10.
- Bora S, Gurram S, Sagi R, Tungani R, Kandula S and Bobbili R (2017) Effect of Sex on Hemato Biochemical parameters of indigenous chicken breeds in Telangana state. *Int. J. Livestock Res.* **7**(10), 212-218.
- Desta T T (2021) The genetic basis and robustness of naked neck mutation in chicken. *Trop. Anim. Hlth Prod.* **53**(1), 1-13.
- Isidahomen C E and Njidda A A (2012) Haematology and Carcass characteristics of Naked neck, Frizzled and normal feathered Local chickens in Southern Nigeria. *Savannah J. Agric.* **7**, 12-19.
- Islam M S, Lucky N S, Islam M R, Ahad A, Das B R, Rahman M M and Siddiui M S I (2004) Haematological parameters of Fayoumi, Assil and local chickens reared in Sylhet region in Bangladesh. *Int. J. Poult. Sci.* **3**(2), 144-147.
- Jubril A E, Fayeye T R, Ademola A A and Gunn H H (2019) Auto-sexing potential and growth performance in Rhode Island, Nigerian local chickens and their reciprocal crosses. *Nigerian J. Anim. Prod.* **46**(5), 1-8.
- Kejela Y (2020) Introduction of the exotic breeds and cross breeding of local chicken in Ethiopia and solution to genetic erosion: A review. *Afr. J. Biotech.* **19**(2), 92-98.
- Khan T A and Zafar F (2005) Haematological study in response to varying doses of estrogen in broiler chicken. *Int. J. Poult. Sci.* **4**(10), 748-751.
- Khawaja T, Khan S H, Mukhtar N and Parveen A (2012) Comparative study of growth performance, meat quality and haematological parameters of Fayoumi, Rhode Island Red and their reciprocal crossbred chickens. *Italian J. Anim. Sci.* **11**(2), 210-216.
- Khawaja T, Khan S H, Parveen A and Iqbal J (2016) Growth performance, meat composition and haematological parameters of first generation of newly evolved hybridized pure chicken and their crossbred parents. *Veterinarskiarhiv* **86**(1), 135-148.
- Kundu A, De A K, Kundu M S, Sunder J and Jeyakumar S (2013) Comparative haematology of Vanaraja, Nicobari fowls and their various F1 crosses under hot humid climate of Andaman and Nicobar Islands, India. *Veterinary World* **6**(12), 1008.
- Lalev M, Mincheva N, Oblakova M, Hristakieva P and Ivanova I (2014) Estimation of heterosis, direct and maternal additive effects from crossbreeding experiment involving two White Plymouth Rock lines of chickens. *Biotechnology in Animal Husbandry* **30**(1), 103-114.
- Lin C Y, Hsu J C and Wan T C (2020) The Effect of caponization on the blood physiological value of Taiwan male native chickens. *Livestock Research* **53**(4), 253-265.
- Medihin T, Getachew B, Aleme H, Mekuria A and Teshome N (2018) Evaluation of Local Chickens Erythrocyte in Alamata district, North Ethiopia. *Res. Anal. J.* **1**(1), 1-4.
- Melesse A, Maak S and Von Lengerken G (2005) The performance of naked neck and their F1 crosses with Lohmann White and New Hampshire chicken breeds under long-term heat stress conditions. *Ethiopian J. Anim. Product.* **5**, 91-107.
- Naveen Z, Naik B R and Shakila S (2019) Haematological parameters, carcass characteristics and technological meat quality attributes of rajasri chicken. *Int. J. Chem. Stud.* **7**(3), 2606-2612.
- Pagala M A, Indi A, Badaruddin R, Sandiah N and Aprianti N (2020) The egg fertility from offspring of crossbreeding results of Bangkok chickens and laying hens. In : *IOP Conference Series: Earth and Environmental Science* **465**(1), 012052.
- Peters S O, Gunn H H, Imumorin I G, Agaviezor B O and Ikeobi C O N (2011) Haematological studies on frizzled and naked neck genotypes of Nigerian native chickens. *Trop. Anim. Hlth Prod.* **43**(3), 631-638.
- Premavalli K and Omprakash A V (2020) Comparative hatching performance of normal feathered Nandanam broiler-3, Naked Neck and Naked Neck x Nandanam broiler-3 cross broiler breeders under intensive system of management. *J. Entomol. Zool. Stud.* **8**(2), 1495-1498.
- Usman M, Mahmud A, Hussain J and Javid A (2020) Performance of Rhode Island Red, Black Australorp and Naked Neck crossbreds under alternative production systems. *South Afr. J. Anim. Sci.* **50**(4), 564-577.
- Abdel Latif M K, Tariq M M and Samir A A (2013) Effect of (NaNa) gene on fertility and hatchability of local LB3 chicken under high thermal conditions. *Libyan J. Agricult. Sci.* **18** (1-2), 40-47.