Effect of the genetic structure and sex local Iraqi chicken and Brahman in some hematological treaties

Ahmed T. Taha\textsuperscript{1} and Tareq Khalaf Hasan Aljumaily\textsuperscript{2}

Department of Animal Production-College of Agric.-Tikrit University

dr.att@tu.edu.iq; dr.att76@gmail.com; Tariq.aljomaily@tu.edu.iq

Abstract:
This study conducted in the Physiological Laboratory of the Department of Animal Production / College of Agriculture / Tikrit University, with the aim of finding out the effect of the genotype and sex of local chickens and Brahman chickens on some hematological traits. Used 24 blood samples, twelve samples from local chickens and Brahman chicken, with six samples for both sexes. After performing the hematological analyzes, the following results showed A significant effect of the genotype was observed in the TCH, HB, MCV and MCH. Moreover, it showed a significant increasing for domestic chickens compared to Brahman chickens. The total number of red and white blood cells did not significantly affect the genotype. Sex had a significant effect on most of the studied traits (HCT, HB, RBC, MCV, and, MCHC), where males significantly outperformed females. The interaction between genotype and sex had a noteworthy impact \((p \leq 0.05)\) on most of the considered characteristics, and it by and large demonstrated a noteworthy diminish within the examined characteristics in female Brahman chickens compared to male and female residential chickens and indeed male Brahman. However, not effect in WBC count. From the results local chickens recorded to exceed expectations in most of the physiological characteristics and for both genders, the immune status of both genetic structure was rise to, and this may show the versatility of the Brahman chickens to the Iraqi airspace.

Keywords: local Iraqi chickens, Brahman chickens, sex, blood

1. Introduction

From the 1960s, selection and genetic improvement processes on Iraqi domestic chickens began, and after four decades, six genotypes were purified after generations of selection depended on feather color and distribution as well as the shape of the crest (Al-Hadithi, 2002). In light of the repercussions of the battle on Iraq in 2003, this neighborhood abundance was totally lost, which incited those responsible for it right now to get back to the advantage of nearby chickens (Al Rekabi et al,2017). The corruption (Al-Bayati, 1992) just as its transformation to the hot natural states of bearing warmth stress (Al-Khalidi, 1990). This adaptation of the local chicken was due to its genetic factors and its interaction with the...
natural selection factors it was exposed to, and this helped to make it more resilient to all stressful natural factors, as it was assumed (Wang, et al, 2018).

On the other hand, after the opening of worldwide markets and the ease of transporting materials and deals due to the improvement of computer advances and, electronic communication, distinctive sorts of poultry and distinctive hereditary combinations entered Iraq, a few of which have adjusted to the Iraqi environment, and a few of them found trouble or influenced execution in one way or another. All things considered, these sorts started to require up a put within the nearby advertise in terms of supply and request due to their beneficial and formal qualities. Among these species, Brahma chicken has the advantage of being a dual-purpose chicken(Lyimo et al,2014)and is frequently dependable within the generation of meat in numerous nations of the world, as well as the aesthetics of its shape and the thickness of the quills secured in its body (ALBC, 2009). In this manner, this consider came to appear the impact of the genotypes and sex of neighborhood and Brahma chickens on a few blood characteristics. The matter through which it is conceivable to supply a database for laborers within the field of hereditary enhancement to advantage from it for the reason of making strides neighborhood poultry or expanding the flexibility of this imported chicken and thus achieving advantage for the production of genotypes that will be valuable within the areas of poultry generation in Iraq.

2. Materials and methods

This consider was conducted within the Physiological Research facility of the Division of Creature Generation / College of Agriculture / Tikrit University with the point of finding out the impact of the genotype and sex of local chickens and Brahma chickens on a few hematological characteristics. From November 10 to December 10, 2019.

Animals of study.

In this study, blood tests from local chickens and Brahma chickens of sexual development were utilized, which were gotten from the Hajj region, raised in a domestic breeding field.

Animal management:

Birds were reared in breeding pen with deep Sand litter. Feeding and watering were ad libitum. Feeding of poultry was providing by commercial feed mixture Food waste and some natural grass in breeding area. Fresh clean water was supplied daily. Birds were exposed to natural light as a practiced in rural areas of central Iraq, north of Baghdad, Tikrit city. Astronomically, the province is located at a longitude of 43.35 degrees east of the Greenwich Line, and a circle of latitude 34.27 degrees north of the equator.

Blood collection:

Blood was collected from the wink vein of 12 males and 12 females from neighborhood chickens and Brahma chickens, employing a restorative syringe of 5 ml. After blood was drawn, put straightforwardly into tubes containing anticoagulant for the reason of conducting blood tests, which incorporate
Hematocrit (HCT)%

Hemoglobin (HGB) (g/dL)

The total red blood cells RBC (10^6/μL)

White blood cells (WBC) (10^3/μL)

Mean Corpuscular Volume (MCV) (fl)

Mean Corpuscular Hemoglobin (MCH) (pg)

All parameters measured as the method of (Campbell), 1995. Except hemoglobin was measured by using a ready-made assay kit after preparing the samples according to the method of work attached to the manufacturer, and it was measured using a spectrophotometer at a wavelength of 543nm.

Statistical analysis:

The information were analyzed factually utilizing ready – made measurable investigation program SAS 2012 according to the design of a factorial experiment 2 × 2 in a complete random design, to demonstrate the effect of genotype and sex on the traits, significance of difference among the groups was assessed using Duncan’s (1955). new multiple range test significance was set as p<0.05.

3. Results and discussion:

Noticed from the results of Table (1) that the local chickens have a significant superiority the Hematocrit (HCT)% compared to the Brahma chickens. There was no significant effect of the sex in this trait on the local chickens, while female Brahma chickens recorded a significant decrease in this trait compared to females and males of both structures. Geneticists when studying the effect of the overlap between genotype and gender. In addition, to appear the impact of the bird's sex, we find significant superiority of males at the level of probability (p≤ 005) compared to females.

The comes about Table (2) appear a noteworthy prevalence of neighborhood chickens in blood hemoglobin concentration compared to Brahma chickens, and female Brahma chickens recorded a critical diminish in this characteristic compared to females and males of both genotypes when examining the impact of the interaction between genotype and sex. To appear the impact of bird's sex on the hemoglobin concentration, we note a critical prevalence of males at the likelihood level (p≤ 005) compared to females.

The genotype did not have a noteworthy impact overall number of RBC agreeing according to the results shown Table (3). Overall, the sex of fowls had a noteworthy impact (p≤ 005) on the RBC count, which showed up to be essentially predominant to roosters compared to hens. The cover between the effect of the breed and the sex. We are able watch a critical diminish within the add up to number of RBC for female Brahma chickens compared to males chickens. In addition, we take note that male Brahma Moreover, we notice that male Brahma significantly outperforms domestic female chickens in the RBC.
Table (1) the effect of the genetic structure and sex local chicken and chicken Brahman in Hematocrit (HCT)\% (values are averages ± standard error)

| Factors affecting | Hematocrit (HCT)\% |
|-------------------|---------------------|
| Chickens genotype |                     |
| Local chickens    | 29.3 ±0.91 a        |
| Brahma chicken    | 25.1 ± 2.0 b        |
| **Significance level** | *                  |
| Sex effect        |                     |
| Male              | 29.8 ± 0.4 a        |
| Female            | 24.6 ± 1.9 b        |
| **Significance level** | *                  |
| Chickens genotype |                     |
| Local chickens    |                     |
| Male              | 30.6 ± 0.3 a        |
| Female            | 28.0 ± 1.52 b       |
| Brahma chicken    |                     |
| Male              | 29.0 ± 0.5 a        |
| Female            | 21.3 ± 2.4 b        |
| **Significance level** | *                  |

*a* Means within a column within titer with no common superscript differ significantly

*refers to significant difference at the level of the probability p<0.05

Table (2) the effect of the genetic structure and sex local chicken and chicken Brahman in Hemoglobin (HGB) (g/dL) (values are averages ± standard error)

| Factors affecting | Hemoglobin (HGB) (g/dL) |
|-------------------|-------------------------|
| Chickens genotype |                         |
| Local chickens    | 8.6 ± 0.3 a             |
| Brahma chicken    | 7.6 ± 0.4 b             |
| **Significance level** | *                  |
| Sex effect        |                         |
| Male              | 8.7 ± 0.2 a             |
| Female            | 7.5 ± 0.4 b             |
| **Significance level** | *                  |
| Chickens genotype |                         |
| Local chickens    |                         |
| Male              | 9.0 ± 0.2 a             |
| Female            | 8.1 ± 0.4 a             |
| Brahma chicken    |                         |
| Male              | 8.4 ± 0.1 a             |
| Female            | 6.8 ± 0.4 b             |
| **Significance level** | *                  |

*a* Means within a column within titer with no common superscript differ significantly

*refers to significant difference at the level of the probability p<0.05
Table (3) the effect of the genetic structure and sex local chicken and chicken Brahman in the total red blood cells RBC (10⁶/μL) (values are averages ± standard error)

| Factors affecting | RBC (10⁶/μL) |
|-------------------|--------------|
| Chickens genotype |              |
| Local chickens    | 1.97 ± 0.08 a|
| Brahma chicken    | 2.02 ± 0.11 a|

Significance level  N.S

| Sex effect | Male | Female |
|------------|------|--------|
| Male       | 2.18 ± 0.07 a | 1.81 ± 0.4 b |
| Female     |      |        |

Significance level  *

Means within a column within titer with no common superscript differ significantly

*refers to significant difference at the level of the probability p<0.05

Table (4) refers to no significant differences in the total number of white blood cells between Iraqi domestic chickens and Brahma chickens, as well as no significant effect of the sex of birds in this trait was recorded. In addition, this may have an effect on the interaction between breed and sex, which led to the absence of significant differences among all study variables.

Local chickens recorded a significant increase in average red blood cell volumes compared to Brahma chickens, while the sex of chickens (male and female) did not have a significant effect on this trait. When studying the effect of the overlap between genotype and sex, we can notice a significant superiority of Iraqi domestic chickens compared to female Brahma chickens (Table 5).

From the results of Table (6), it is noticed that there is a significant superiority (p≤ 0.05) in the MCH in domestic chickens compared to Brahma chickens. Birds are also a significant influence in this trait.

Table (4) the effect of the genetic structure and sex local chicken and chicken Brahman in the white blood cells (WBC) (10⁳/μL) (values are averages ± standard error)

| Factors affecting | (WBC) (10⁳/μL) |
|-------------------|----------------|
| Chickens genotype |                |
| Local chickens    | 17.3 ± 0.49 a  |
| Brahma chicken    | 16.9 ± 2.93 a  |

Significance level  N.S
### Table (5) the effect of the genetic structure and sex local chicken and chicken Brahman in the Mean Corpuscular Volume (MCV) (fl) (values are averages ± standard error)

| Factors affecting          | (MCV) (fl) |
|----------------------------|------------|
| Chickens genotype          |            |
| Local chickens             | 148.8 ± 3.22 a |
| Brahma chicken             | 124.2 ± 6.78 b |
| Significance level          | N.S        |
| Sex effect                 |            |
| Male                       | 137.4±5.38 a |
| Female                     | 135.6 ± 9.35 a |
| Significance level          | N.S        |

*Means within a column within titer with no common superscript differ significantly

*refers to significant difference at the level of the probability p<0.05

### Table (6) the effect of the genetic structure and sex local chicken and chicken Brahman in the Mean Corpuscular Hemoglobin (MCH) (pg) (values are averages ± standard error)

| Factors affecting          | (MCH) (pg) |
|----------------------------|------------|
| Chickens genotype          |            |
| Local chickens             | 43.7± 1.04 a |
| Brahma chicken             | 38.0 ± 1.56 b |
| Significance level          | *          |
| Sex effect     | Male        | 40.3 ± 1.62 a |
|---------------|-------------|--------------|
|               | Female      | 41.3 ± 1.95 a |

| Significance level | N.S |
|--------------------|-----|

| Chickens genotype | Local chickens | Sex effect | Male | 43.3 ± 2.13 a |
|-------------------|----------------|------------|------|--------------|
|                   |                | Female     | 44.0 ± 0.59 a |

| Brahma chicken    | Male          | 37.4 ± 0.81 a |
|                   | Female        | 38.6 ± 3.40 a |

| Significance level | N.S |
|--------------------|-----|

*Means within a column within titer with no common superscript differ significantly

*refers to significant difference at the level of the probability p<0.05

**Discussion:**

The reason for these significant differences in the HTC and Hb values in favor of local chickens may be due to differences in average red blood cell sizes and Hb concentration in cells. Salah (2008) observed a positive correlation between these characteristics. Moreover, we note from the results in general the male superiority over in females. In the HTC, HB and RBC, this difference may be due to the effect of secretion sex hormones that have a direct effect on the number of red blood cells (Pértille et al., 2020). Indicated that the testosterone hormone has an effect that increases the total number of cells Red blood by stimulating the production of the erythropoietin hormone from the kidney (Norris & Carr, 2020). While the estrogen hormone has a lowering effect on the production of erythropoietin and this leads to a decrease in the production of RBC from the bone marrow (Li et al., 2021). Hemoglobin in male Iraqi domestic chickens compared with females. The reason for the superiority of local chickens in average MCV and MCH in vinegar may be due to genetic adaptation (Al-Maksousi et al., 2019), being stable in the region for several centuries, and this reflected in the size of these birds and the nature of their physiological processes. The differences were not significant with regard to the total number of WBC between local chickens and Brahma chickens. And even between the sexes of males and females of domestic chickens or Brahma chickens, this may be due to the stability of the immune status of birds (Bello et al., 2018) and this result did not agree with what Al-Nadawi (2002) found of high in the number of white blood cells in domestic females compared to males.

**4. Conclusions:**

In spite of the fact that the local chickens recorded to exceed expectations in most of the physiological characteristics and for both genders, the immune status of both genetic structure was rise to, and this may show the versatility of the Brahma chickens to the Iraqi airspace.

**5. References:**

[1] Al_hadythi, A. T. 2002. Blood protein and enzyme polymorphism of different Iraqi chicken. MSc. Thesis College of Agriculture. Baghdad University.

[2] ALBC, American Livestock Breeds Conservancy. Copyright. 1993-2009 American Livestock Breeds Conservancy.
[3] Al-Maksousi, S. K., Al-Hayani, W. K., & Hussein, F. M. (2019). Effect of the level of corticosteron hormone in the blood of local iraqi chicken mothers on the sex ratio of the produced offsprings. Plant Archives, 19(2), 1411-1415.

[4] AL-Nedawi , A.M. 2002. Evaluation of some blood characteristics of different types of chickens under different seasons after several generations of selection basis of color. MSc. Thesis College of Agriculture. Baghdad University.

[5] AlRekabi, M. M. J., & ALKhazraji, A. A. H. (2017). Association of Growth Hormone Gene Polymorphism with some Production Traits in Iraqi Local Chicken. Tikrit Journal for Agricultural Sciences, 17.

[6] Al-Soudi, K. A., and I. Sokker. 1973. Evidence of resistance to Newcastle diseases in native chicken. Iraqi. J. Agric. Sci. 8.

[7] Bello, N. T., Cohick, W. S., McKeever, K. H., & Malinowski, K. (2018). Paul D. Sturkie: Avian cardiac physiologist. Poultry science, 97(6), 2203-2206.

[8] Campbell .W.T. 1995. Avian Hematology and Cytology–second edi. Iowa State Press A Black well Publishing Company.

[9] Duncan, D. B. 1955. Multiple range and multiple test. Biometrics .11: 1-42.

[10] Hanusova, E., Hrnčár, C., Hanus, A., and Oravcova, M. 2015. Effect of breed on some parameters of egg quality in laying hens. Acta fytotechnica et zootechnica, 18(1), 20-24.

[11] Hutt, F. B., 1949. Genetic of the fowl. New York , N. Y. Mcgrow Hill Book Co.

[12] Li, H., Hu, B., Hu, S., Luo, W., Sun, D., Yang, M., ... & Zhang, X. (2021). High expression of BCL6 inhibits the differentiation and development of hematopoietic stem cells and affects the growth and development of chickens. Journal of Animal Science and Biotechnology, 12(1), 1-13.

[13] Lyimo, C. M., Weigend, A., Msoffe, P. L., Eding, H., Simianer, H., & Weigend, S. (2014). Global diversity and genetic contributions of chicken populations from a frican, a sian and e uropean regions. Animal genetics, 45(6), 836-848.

[14] Norris, D. O., & Carr, J. A. (2020). Vertebrate endocrinology. Academic Press.

[15] Pértille, F., Ibelli, A. M. G., Sharif, M. E., Poleti, M. D., Fröhlich, A. S., Rezaei, S., ... & Coutinho, L. L. (2020). Putative epigenetic biomarkers of stress in red blood cells of chickens reared across different biomes. Frontiers in genetics, 11, 1202.

[16] Wang, Y., Saelao, P., Chanthavixay, K., Gallardo, R., Bunn, D., Lamont, S. J., ... & Zhou, H. (2018). Physiological responses to heat stress in two genetically distinct chicken inbred lines. Poultry science, 97(3), 770-780.