Iosr Journal Of Agriculture And Veterinary Science (Iosr-Javs)
E-Issn: 2319-2380, P-Issn: 2319-2372. Volume 17, Issue 12 Ser. 1 (December. 2024), Pp 25-31
Www.Iosrjournals.Org

Production Performance In Relation To Blood Parameters In Two Different Genotypes Of Egyptian Chickens (Sinai And Silver Montazah).

Abou-Elewa E.M.; M.E. Soltan And S.A. Farrag
(Poult. And Fish Prod. Dept., Fac. Of Agric., Menoufia Uni., Egypt)

Abstract:
Background*: Hematological parameters in chickens have been shown to be influenced by several factors, physiological, genotypical conditions and other environmental conditions. The relationship between complete blood count (CBC) parameters and egg production traits in chickens is an area of significant interest in poultry research. understanding these relationships can provide insights into the health and productivity of laying hens.*
Materials and Methods*: Recent study took place to examine the relationship between production performance and some blood parameters in two different genotypes of Egyptian chickens (Sinai and Silver Montazah), blood parameters which studied, were count of white blood cell (WBC), count of red blood cell (RBC), hemoglobin (HGB), hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and count of platelet (PLT), and some of egg production traits were age at sexual maturity (ASM), Egg production in the first 90th days (EN90), average weight of the first five eggs (EWsm), number of days to produce the first five eggs produced (D5egg), body weight at the first egg (BWsm), body weight at 35 weeks (BWm),average weight of five eggs at 35 weeks (EWm), average clutches length (CLS),and average relax days between clutches (Relax L.). Data collected individually and analyzed using appropriate methodology.*
Results*: The main results can be summarized as follows:*
- *Sinai hens were higher in most means of blood parameters (RBC, HGB, HCT, MCV, MCH, and MCHC) compared to Silver Montazah hens, except for two blood parameters (WBC, and PLT) Silver Montazah hens were higher than Sinai hens. All of differences between different two local chicken strains (Sinai and Silver Montazah) were not significant except (PLT.) was highly significant differences.*
- *Silver Montazah hens were higher in most means of production traits mean (ASM, EN90, EWsm, EWm, BWsm, BWm, Days5eggs, CLS.) compared to Sinai hens, except (Relax L) Sinai hens were higher than Silver Montazah hens. All of differences between different two local chicken strains (Sinai and Silver Montazah) were not significant except for (EWSM) there were significant differences.*
- *Simple correlation coefficients values between blood parameters and studied production traits studied in both Strains were insignificant and ranged between 0.003 (between EN90 and MCV) and 0.309 (between ESM and MCHC). This means that there was a weak relation between these blood parameters and egg production traits.*
- *The Dendrogram lined by clustering analysis clearly reflected the results obtained from analysis of variance in current study, since all either main or sub-clusters included individuals form both studied strains.*

Conclusion: *The CBC parameters of chickens play significant roles in determining egg production traits, ensuring the overall health of laying hens. Further research is needed to clarification the specific mechanisms by which these blood parameters interact with environmental and genetic factors influencing egg production.*
Key Word*: Blood, Egg production, clustering, Chickens.*

Date of Submission: 07-12-2024 Date of Acceptance: 17-12-2024

I. Introduction

Local chicken breeds play a crucial role in poultry production systems worldwide, particularly in regions with harsh environmental conditions. These breeds, adapted to local climates and management practices, show a range of physiological and production characteristics that differentiate them from commercial breeds. Understanding these differences is essential for improving their management and improving productivity. The physiological and production characteristics of local chicken breeds offer valuable insights into their adaptability and performance under varying conditions.

Hematological parameters in chickens have been shown to be influenced by several factors such as season, sex, age and nutrition (Piccione *et al.* 2005). Also, the value of blood constituents is affected by many factors such as physiological, genotypical conditions and other environmental conditions for example, Hematocrit

values will decrease if chickens are under stress conditions, one of which is caused by elevated temperatures, (Pantaya and Utami, 2018).

Chickens CBC is a more important indicator of a bird's general health. The results of the CBC are indicative of the activity of the bird immune system, as it examines and evaluates the red and white blood cells that make up the cellular component of blood. (Sayed *et al*. 2024). Hematological parameters indicated potential benefits in erythrocyte indices in case of existing anemia (Sayed *et al.* 2024). The increased WBC's is a good indicator of immune status, this result was confirmed by findings of Attia *et al.* (2014). Also, Coles (1986) WBC count reveals immune system activity. Elevated WBCs suggest infection, while reduced counts could indicate immunosuppression.

The relationship between complete blood count (CBC) parameters, such as WBC, RBC, HGB, HCT, MCV, MCH, MCHC, and PLT, and egg production traits in chickens is an area of significant interest in poultry research. understanding these relationships can provide insights into the health and productivity of laying hens. RBC count shows oxygen-carrying capacity. Lower RBCs suggest anemia, while elevated levels might show dehydration or polycythemia, (Tvedten, 2010). MCV measures the average size of RBCs and is an important indicator of their function. HCT reflects the proportion of blood occupied by RBCs, showing hydration status and oxygen transport efficiency. (Kaneko *et al.*, 2008). Alterations in MCV may suggest several types of anemia (Samour, 2008). And changes in MCV can affect oxygen distribution in the body and may signal blood disorders such as macrocytic anemia. This type of anemia involves the production of unusually large red blood cells in the bone marrow, often due to deficiencies in vit. B9 and B12, which are essential for red blood cell formation (Aslinia *et al.*, 2006). In deficiencies of these vitamins, bone marrow produces immature, large, cells called megaloblasts that do not divide normally. As a result of that, fewer mature RBCs are produced, and those that are often do not survive as long in the bloodstream. This leads to a decrease in red blood cell count and causes anemia (Aslinia *et al.*, 2006). Also, Tvedten, 2010) RBC count shows oxygen-carrying capacity. Lower RBCs suggest anemia, while elevated levels might show dehydration or polycythemia. MCH shows the hemoglobin content per RBC. Deviations from normal values can indicate anemia or other blood disorders. (Coles, 1986). MCHC reflects the hemoglobin concentration in each volume of packed RBCs, assisting in diagnosing types of anemia. (Kaneko *et al.*, 2008). HGB measures the oxygen-carrying capacity of blood. Low levels indicate potential anemia, while elevated levels suggest respiratory or cardiac issues. (Campbell, 1995). Platelets are critical for blood clotting. Low platelet count can indicate clotting disorders or bone marrow suppression. (Harvey, 2012).

Pantaya and Utami, (2018) reported that HGB, RBC and HCT still had a positive effect on chicken performance. Williams *et al.* (2004) showed that associated changes in hematological parameters may play a significant role in shaping the costs of egg production via reducing the total oxygen carrying capacity of the blood. Kern *et al.* (1972) noted that the decrease in hematocrit during initial stages of egg production is due to osmoregulatory processes (hemodilution) associated with estrogen-dependent changes in lipid metabolism and rate of increase of yolk precursors in the blood. Chen *et al.* (2021) showed that Healthy chickens with normal WBC counts lay more eggs. Hrabcakova *et al.* (2014) reported that at the end of the laying period, a higher count of WBC was noted, while for HCT, lower values were recorded.

The recent study main aim studying production performance in relation to blood parameters in two different genotypes of Egyptian chickens (Sinai and Silver Montazah).

II. Material And Methods

Chickens used in this study were reviewed and approved by the Animal Welfare Committee of Menoufia University -Faculty of Agriculture- Shibin El-Kom. The study took place on the Poultry and Fish Production Department, Faculty of Agriculture, Menoufia University, Egypt. Thirty randomly selected hens were used, including (15) Sinai chicken hens as indigenous strain and (15) Silver Montazah hens as synthetic strain. The study was conducted during the year 2020.

Studies traits:

Complete Blood Count (CBC) analysis, abbreviations are used to be different components of the blood.

- RBC - Red Blood Cell Count: Measures the number of red blood cells in the blood.
- HGB - Hemoglobin: Measures the amount of hemoglobin, a protein in red blood cells that carries oxygen.
- HCT - Hematocrit: Percentage of blood volume made up by red blood cells.
- MCV - Mean Corpuscular Volume: Average size of red blood cells.
- MCH - Mean Corpuscular Hemoglobin: Average amount of hemoglobin per red blood cell.
- MCHC - Mean Corpuscular Hemoglobin Concentration: Average concentration of hemoglobin in red blood cells.
- WBC - White Blood Cell Count: Measures the number of white cells.
- PLT - Platelet Count: Measures the number of platelets which take part in blood.

Blood samples were collected individually from every Hen from the wing vein. Sample value about three- ml in specific tubes Contained anticoagulant. The anti-coagulated blood was used to decide red blood cell (RBC) count, packed cell volume (PCV), hemoglobin (HGB) concentration and white blood cell (WBC) count were made on monolayer blood films, fixed, and stained with Giemsa Wright's stain. Total RBC and total WBC counts were found manually using a hemocytometer (Campbell, 1995). PCV was. measured by a standard manual technique using microhematocrit capillary tubes centrifuged at 2500 rpm for five minutes. Hemoglobin concentration was measured by Cyanmethemoglobin method. Erythrocyte indices, that is, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), and mean corpuscular hemoglobin concentrations (MCHC) were calculated from total RBC, PLT and HGB (Ritchie *et al.*, 1994), respectively.

Egg production traits:
Egg production traits were individually recorded as follows:
- ASM.: Age at First laying egg.
- EN90: Egg production in the first 90th days.
- EWsm: Average weight of the first five eggs.
- D5egg: Number of days to produce the first five eggs produced.
- BWsm: Body weight at the first egg.
- BWm: Body weight at 35 weeks.
- EWm: Average weight of five eggs at 35 weeks.
- CLS: Average clutches length.
- Relax L: Average relax days between clutches.

Statistical analysis:
Data were collected and analyzed using IBM-SPSS program v.26 (IBM-SPSS, 2019).
The following statistical model was used:

$$Y_{ij} = \mu + G_i + E_{ij}$$

where:
Y_{ij} = value of jth observation of ith genotype
μ = overall mean common to all observations.
G_i = effect of ith genotypes.
E_{ij} = the random error assumed to be normally distributed with zero mean and variance σ_e^2

Correlation coefficients were calculated according to the equation implemented IBM-spss program statistics software according to the bivariate analysis of correlation coefficients (IBM-SPSS, 2019).

Hierarchical clustering analysis: clustering applied using Euclidean distance and Ward's method. Dendrogram of collected data for studied traits (i.e. production and blood parameters) lined by OriginPro program software version 2024b (OriginPro, 2024)

III. Results

Table no.1 showed that means of investigated hematological parameters (WBC, RBC, HGB, HCT, MCV, MCH, MCHC and PLT) mean in two different local chicken strains (Sinai and Silver Montazah) 42 weeks old two-week-old hens. Hematological parameters (WBC, RBC, HGB, HCT, MCV, MCH, MCHC and PLT) means ($\bar{X}$±S.E) in Silver Montazah hens were 349.22103/uL, 2.13106/uL, 8.78 g/dL, 26.53 L/L, 124.99(µm3, 41.52 pg, 33.13% and 25.07, respectively. Which, in Sinai hens were 334.31103/uL, 2.16106/uL, 9.43 g/dL, 27.74 L/L, 128.02µm3, 43.70 pg, 34.15% and 24.60, respectively. From Table no.1 we found that Sinai hens were higher in most means of hematological parameters (RBC, HGB, HCT, MCV, MCH, and MCHC) compared to Silver Montazah hens, except for two blood parameters (WBC, and PLT) Silver Montazah hens was higher than Sinai hens. All of differences between two different local chicken strains (Sinai and Silver Montazah) were not significant except (PLT.) was highly significant differences.

Table no 1: Hematological parameters (WBC, RBC, HGB, HCT, MCV, MCH, MCHC and PLT) means ($\bar{X}$±S.E) in two different local chicken strains (Sinai and Silver Montazah) .

Strain	No.	** (WBC) (10^3/ul)	(RBC) (10^6/ul)	(HGB) (g/dl)	(HCT) (L/L)	(MCV) (µm3)	(MCH) (pg)	(MCHC) (%)	PLT
*SM.	15	349.22±26.28	2.13 ±0.10	8.78 ±0.44	26.53 ±1.28	124.99 ±1.76	41.52 ±1.11	33.13 ±0.51	25.07 ±1.99
S.	15	334.31±11.87	2.16 ±0.11	9.43 ±0.48	27.74 ±1.51	128.02 ±1.58	43.70 ±0.88	34.15 ±0.58	24.60 ±2.21
Total	30	341.77±14.23	2.14 ±0.08	9.10 ±0.32	27.13 ±0.98	126.50 ±1.20	42.61 ±0.72	33.64 ±0.39	24.83 ±1.46
Sig.		0.097^{ns}	0.256^{ns}	0.079^{ns}	0.130^{ns}	0.260^{ns}	0.822^{ns}	0.535^{ns}	0.001^{**}

*SM=Silvar Montana chickens, S= Sinai chickens, ** WBC - White Blood Cell Count: RBC - Red Blood Cell Count: HGB - Hemoglobin:,,**HCT** – Hematocrit,,**MCV** - Mean Corpuscular Volume:,**MCH** - Mean

Corpuscular Hemoglobin,,,**MCHC** - Mean Corpuscular Hemoglobin Concentration, and PLT- number of platelets which take part in blood

Table no.2 showed that Production traits mean (ASM, EN90, EWsm, EWm, BWsm, BWm, Days5eggs, CLS., Relax L). in different two local chicken strains (Sinai and Silver Montazah) 42 weeks old two-week-old hens. Production traits mean (ASM, EN90, EWsm, EWm, BWsm, Days5eggs, CLS., Relax L) in Silver Montazah hens were 179.87d., 52.33egg, 34.64gm., 44.14gm., 1143.33gm., 1328.67gm., 9.93d., 2.29d. and 1.84d. respectively. where production traits mean (ASM, EN90, EWsm, EWm, BWsm, BWm, Days5eggs, CLS., Relax L) in Sinai hens were 168.4 d., 46.93 egg, 32.11 gm., 42.95 gm., 1065.00 gm., 1181.67 gm., 9.4 d., 2.55 d. and 3.18 d. respectively. From Table no.2 we found that Silver Montazah hens were higher in most means of Production traits mean (ASM, EN90, EWsm, EWm, BWsm, BWm, Days5eggs, CLS.) compared to Sinai hens, except one (Relax L) Sinai hens were higher than Silver Montazah hens. All of differences between different two local chicken strains (Sinai and Silver Montazah) were not significant except for (EWsm) there were significant differences.

Table no.2: Production traits mean (ASM, EN90, EWsm, EWm, BWsm, BWm, D5eggs, CLS., Relax L). in two different local chicken strains (Sinai and Silver Montazah) .

Strain	**ASM (day)	EN90 (egg)	EWsm (gm.)	EWm (gm)	BWsm (gm)	BWm (gm.)	D5eggs (day)	CLS (day)	Relax L (day)
*SM	179.87 ± 5.39	52.33 ± 2.78	34.64 ± 0.79	44.14 ± 0.81	1143.33 ± 28.66	1328.67 ± 67.11	9.93 ± 1.27	2.29 ± 0.15	1.84 ± 0.16
S	168.40 ± 4.59	46.93 ± 4.53	32.11 ± 0.51	42.95 ± 0.93	1065.00 ± 32.82	1181.67 ± 61.21	9.40 ± 1.44	2.55 ± 0.41	3.18 ± 1.00
Total	174.13 ± 3.64	49.63 ± 2.66	33.37 ± 0.52	43.54 ± 0.62	1104.17 ± 22.61	1255.17 ± 46.67	9.67 ± 0.94	2.42 ± 0.22	2.51 ± 0.51
Sig	0.116^{ns}	0.318^{ns}	0.012^{*}	0.344^{ns}	0.083^{ns}	0.117^{ns}	0.783^{ns}	0.568^{ns}	0.197^{ns}

*SM=Silvar Montazah chickens, S= Sinai chickens, **EN90: Egg production in the first 90th days., EWSM: Average weight of the first five eggs,,D5Egg: Number of days to produce the first five eggs produced., BWSM: Body weight at the first egg., BWM: Body weight at 35 weeks., WM: Average weight of five eggs at 35 weeks. , CLS: Average clutches length., Relax.L . Average relaxes days between clutches.

Table no.3 showed that all simple correlation coefficients values between blood parameters (WBC, RBC, HGB, HCT, MCV, MCH, MCHC and PLT) and egg production traits (ASM, EN90, EWsm, EWm, BWsm, BWm, days5eggs, Clutch S., Relax L) in both Sinai and Silver Montazh hens was insignificant and ranged between 0.003 (between EN90 and MCV) and 0.309 (between D5eggs and MCHC). By tracking the results obtained from Table no.3 the strength of correlation between CBC parameters and egg production traits is between weak and moderate, Also, the mainstream direction is negative. The following is an explanation of the content of Table no.3

- WBC and Egg Production traits: Simple correlation coefficients values between WBC and egg production traits in both Sinai and Silver Montazh hens were positive between WBC and (ASM, EN90, EWsm, , BWm and D5eggs) were 0.208, 0.186, 0.093, 0.08 and 0.257 respectively .On the other hand correlation coefficients values were negative between WBC and (EWm, BWsm, , Clutch S. and Relax L) were -0.097, -0.160, -0.016 and -0.183 respectively.
- RBC and Egg Production Simple correlation coefficients values between RBC and egg production traits (in both Sinai and Silver Montazh hens were positive between RBC and (EN90, EWm, BWm, D5eggs and Relax L) were 0.184, 0.091, 0.067, 0.061 and 0.011, respectively. Where negative between RBC and (ASM, EWsm, BWsm, and Clutch S.) were -0.113, -0.058, -0.036 and -0.139) respectively.
- HGB and Egg Production: Most simple correlation coefficients values between HGB and egg production traits in both Sinai and Silver Montazh hens were negative between HGB and (ASM, EWsm, D5eggs, Clutch S. and Relax L) were -0.237, -0.105, -0.133, -0.030, and -0.099 respectively .where positive between WBC and (EN90, EWm, BWsm, and BWm) were 0.075, 0.164, 0.043 and 0.052 respectively.
- HCT and Egg Production: Most simple correlation coefficients values between HCT and egg production traits in both Sinai and Silver Montazh hens were negative between HCT and (ASM, EWsm, BWsm, D5eggs, Clutch S. and Relax L) were -0.185, -0.116-, -0.043, -0.028, -0.062 and-0.147 respectively. Where positive between WBC and (EN90, EWm, and BWm) were 0.110, 0.070, and 0.041 respectively.
- MCV and Egg Production: All simple correlation coefficients values between MCV and egg Production traits were negative. Simple correlation coefficients values between MCV and egg Production traits (ASM, EN90, EWsm, EWm, BWsm, BWm, D5eggs, Clutch S., Relax L) in both Sinai and Silver Montazh hens were -0.204, -0.294, -0.183, -0.106, -0.040, -0.043, -0.266, -0.291, and -0.039, respectively.
- MCH and Egg Production: Most simple correlation coefficients values between MCH and egg production traits in both Sinai and Silver Montazh hens were negative between MCH and (ASM, EN90, EWsm, BWm, D5eggs,

and Clutch S.) were -0.196, -0.250, -0.083, -0.005, -0.340 and -0.122) respectively. Where positive between WBC and (EWm, and BWsm and Relax L) were 0.0940, 0.130 and 0.073, respectively.

- MCHC and Egg Production: Most simple correlation coefficients values between MCHC and egg production traits in both Sinai and Silver Montazh hens were positive between MCHC and, (EWm, BWsm BWm, Clutch S and Relax L.) were 0.213, 0.219, 0.012, 0.058, and 0.149 respectively. Where negative between MCHC and (ASM, EN90, EWsm and D5eggs) were -0.162, -0.133, -0.and -0.309, respectively.
- PLT and Egg Production: Most simple correlation coefficients values between PLT and egg production traits in both Sinai and Silver Montazh hens were positive. Correlation between MCHC and, (EN90, EWm, BWsm, BWm, D5eggs, Clutch S and Relax L.) were 0.187, 0.147, 0.049, 0.129, 0.121, 0.281 and 0.142, respectively, where negative between MCHC and (ASM, and EWsm) were -0.293 and -0.027, respectively.

Table no.3: Correlation coefficients between blood parameters (WBC, RBC, HGB, HCT, MCV, MCH, MCHC and PLT) and egg production traits (ASM, EN90, EWsm, EWm, BWsm, BWm, D5eggs, Clutch S., Relax L) in Sinai and Silver Montazh hens.

Traits[1]	ASM	EN90	EWSM	EWM	BWSM	BWM	Days5eggs	ClutchS	RelaxL
WBC	0.208	0.186	0.093	-0.097	-0.160	0.083	0.257	-0.016	-0.183
RBC	-0.113	0.184	-0.058	0.091	-0.036	0.067	0.061	0.011	-0.139
HGB	-0.237	0.075	-0.105	0.164	0.043	0.052	-0.133	-0.030	-0.099
HCT	-0.185	0.110	-0.116	0.070	-0.043	0.041	-0.028	-0.062	-0.147
MCV	-0.204	-0.294	-0.183	-0.106	-0.040	-0.043	-0.266	-0.291	-0.039
MCH	-0.196	-0.250	-0.083	0.094	0.130	-0.005	-0.340	-0.122	0.073
MCHC	-0.162	-0.133	-0.003	0.213	0.219	0.012	-0.309	0.058	0.149
PLT	-0.293	0.187	-0.027	0.147	0.049	0.129	0.121	0.281	0.142

[1]WBC: White Blood Cell Count, RBC: Red Blood Cell Count, HGB: Hemoglobin, HCT: Hematocrit, MCV: Mean Corpuscular Volume, M CH: Mean Corpuscular Hemoglobin, MCHC: Mean Corpuscular Hemoglobin Concentration, PLT: number of platelets which take part in blood EN90: Egg production in the first 90 days, EWSM: Average weight of the first five eggs, D5Egg: Number of days to produce the first five eggs produced, BWSM: Body weight at the first egg, BWM: Body weight at 35 weeks, BWM: Average weight of five eggs at 35 weeks, CLS: Average clutches length, Relax.L: The average relaxes days between clutches.

Hierarchical clustering analysis of studied chicken strains:

Dendrogram was constructed to analyze the relation among chickens individually based on their productive and blood parameters traits (Fig.no.1). Data presented in Fig. no.1 showed that all studied individuals can be divided into two main clusters, the first one includes 7 (5 Sinai + 2 S. Montazah) of 30 hens i.e. 23.33% of total number of birds. The second main cluster contains 23 hens (76.66 % of total birds), Sinai chickens represent 43.48% compared to 56.52% for S. Montazah chickens. This cluster (the latter) is divided into 2 sub-clusters that contain 11 birds (5 Sinai + 6 S. Montazah) in the first sub-cluster and 12 birds (5 Sinai + 7 S. Montazah) in the second sub-cluster. Clustering analysis revealed that the similarity between the 2 main clusters obtained in current experiment was 0.0%; while it was approximately 53% between the 2 sub-clusters of the second main cluster. The similarity between the initial 6 clusters as shown in Fig. 2 ranged between 98.3% and 83.3% then these clusters grouped as described above. The clustering analysis clearly reflected the results obtained from analysis of variance in current study, since all either main or sub-clusters included individuals form both studied strains.

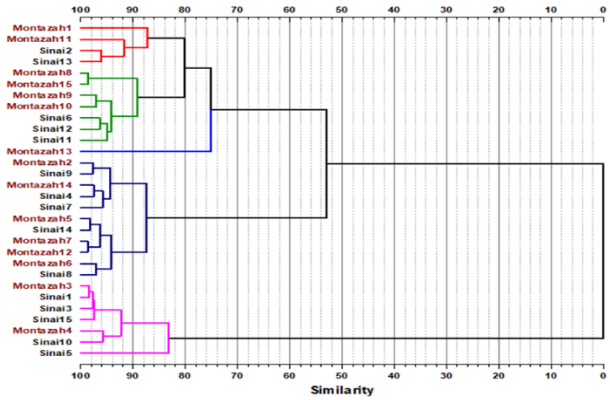

Figure no.1: Hierarchical clustering analysis of studied chicken strains (Sinai and Silver Monyazah).

IV. Discussion

These results were agreed with. Alsobayel et.al. (1990) observed that a lack of clear relationship blood the parameters between egg production.

Healthy chickens with normal WBC counts lay more eggs. Chen *et al.* (2021) referred to that white blood cell counts are indicative of the immune status of chickens. Higher WBC counts may suggest an active immune response, potentially impacting egg production negatively if the immune system is overactive or if there is chronic stress. Highlighted the importance of immune function in relation to egg production.

RBC, HGB, and HCT are critical for oxygen transport and overall health. Rajkumar *et al.* (2020) found that increased body weight (BW) negatively correlated with egg production traits, which may also relate to RBC and HGB levels, as heavier birds may have altered blood parameters that affect their reproductive efficiency. Furthermore, (Huang *et al.*, 2022) indicated that variations in HGB and HCT could correlate with egg production rates, suggesting that optimal blood parameters are essential for maintaining high egg production.

MCV, MCH, and MCHC provide insights into the size and hemoglobin content of red blood cells (Tongsiri *et al.*, 2019). These parameters can reflect the nutritional status of the birds, which is related to their egg production capabilities. reported that nutritional deficiencies could lead to suboptimal CBC values, which in turn could negatively affect egg production traits. Therefore, checking these parameters can help in assessing the health and productivity of laying hens.

Low platelet count can indicate clotting disorders or bone marrow suppression (Harvey, 2012Research on the melatonin receptor gene indicated that physiological stress, which could be reflected in PLT variations, might also influence egg production traits.

Clustering analysis had been previously used successfully to differentiate between egg quality traits during laying cycle (Sirri *et al.*, 2018); classification of rabbit meat quality (Lariviere-Lajoie *et al.*, 2021); and recently for identifying broiler farmers according to their behavior in application of biosecurity against avian flu (Pao *et al.*, 2024).

V. Conclusion

In conclusion, CBC parameters of chickens play significant roles in determining egg production traits, ensuring the overall health of laying hens. Further research is needed to clarification the specific mechanisms by which these blood parameters interact with environmental and genetic factors influencing egg production.

.

References

[1]. Alsobayel A, Attia F, Bayoumi M, Haroun I. (1990). Hematological Response Of Saudi Arabian Fowl To Protein Rearing Regimens
[2]. Anim Biosci;3(2):107-114. Doi: Https://Doi.Org/10.5713/Ajas.1990.107
[3]. Aslinia, F.; J. J Mazza, And S. H. Yale (2006). Megaloblastic Anemia And Other Causes Of Macrocytosis. Clin Med Res. 4(3):236-241. Doi: 10.3121/Cmr.4.3.236.
[4]. Attia, Y. A.; A. E. Abd El Hamid, M.S. Ibrahim, M. A. Al-Harth, F. Bovera And A. El-Naggar. (2014). Productive Performance, Biochemical And B. Hematological Traits Of Broiler Chickens Supplemented With Propolis, Bee Pollen And Mannan Oligosaccharides Continuously Or Intermittently. Livest. Sci., 164:87-95.
[5]. Campbell, T. W. (1995). Avian Hematology And Cytology (2nd Ed.). Iowa State University Press. Egyptian Fayoumi Chickens. Journal Of Animal And Poultry Research, 44(2), 147-153.
[6]. Chen, X., Sun, X., Chimbaka, I., Qin, N., Xu, X., Liswaniso, S., And J. Gonzalez (2021). Transcriptome Analysis Of Ovarian Follicles Reveals Potential Pivotal Genes Associated With Increased And Decreased Rates Of Chicken Egg Production. Frontiers In Genetics, 12. Https://Doi.Org/10.3389/Fgene.2021.622751.
[7]. Coles, E. H. (1986). Veterinary Clinical Pathology (4th Ed.). W.B. Saunders Company.
[8]. Harvey, J. W. (2012). Veterinary Hematology: A Diagnostic Guide And Color Atlas. Elsevier.
[9]. Hrabcakova,P.; E. Voslarova ; I. Bedanova; V. Pistekova ; J. Chloupe, (2014). Changes In Selected Haematological And Biochemical Parameters In Debeaked Pheasant Hens During The Laying Period. Ankara Üniv Vet Fak Derg, 61: 111-117.
[10]. Huang, X., Zhang, H., Cao, H., Zhou, W., Xiang, X., & Yin, Z. (2022). Transcriptomics And Metabolomics Analysis Of The Ovaries Of High And Low Egg Production Chickens. Animals, 12(16), 2010. Https://Doi.Org/10.3390/Ani12162010
[11]. Ibm Corp. Released (2019). Ibm Spss Statistics For Windows, Version 26.0. Armonk, Ny: Ibm Corp.
[12]. Kaneko, J. J., Harvey, J. W., And Bruss, M. L. (2008). Clinical Biochemistry Of Domestic Animals (6th Ed.). Elsevier.
[13]. Kern, M. D., De Graw, W. A. And King, J. R. (1972). Effects Of Gonadal Hormones On The Blood Composition Of White-Crowned Sparrows. Gen. Comp. Endocrinol. 18, 43-53.
[14]. Larivière-Lajoie A-S., Cinq-Mars D., Guay F., Binggeli S., Dalmau A., Saucier L. (2021). Hierarchical Clustering As A Tool To Develop A Classification Scheme For Rabbit Meat Quality. World Rabbit Sci., 29: 129-149.
[15]. Originpro, Version 2024b (2024). Originlab Corporation, Northampton, Ma, Usa.
[16]. Pantaya D. And M. M. D. Utami (2018). The Blood Haematological Profile On Laying Hens That Treated By Different Levels Of Yeast Supplementation. Iop Conf. Ser.: Earth Environ. Sci. 207 012033. Https://Iopscience.Iop.Org/Article/10.1088/1755-
[17]. Pao Hai-Ni, Elizabeth L. Jackson, Tsang-Sung Yang, Jyan-Syung Tsai, Yi-Ting Hwang, Watson H.T. Sung, Dirk U. Pfeiffer (2024). Clustering Broiler Farmers Based On Their Behavioral Differences Towards Biosecurity To Prevent Highly Pathogenic Avian Influenza. One Health, Volume 19: 100852.
[18]. Piccione G, Fazio F, Giudice E, Grasso F, Morgante M. (2005). Nycthemeral Change Of Some Haematological Parameters In Horses. Journal Of Applied Biomedicine 3:123-
[19]. Rajkumar, U.; L. Prince; S. Haunshi; C. Paswan, And R. Chatterjee, (2020). Estimation Of Breeding Value, Genetic Parameters And Maternal Effects Of Economic Traits In Rural Male Parent Line Chicken Using Pedigree Relationships In An Animal Model. Journal Of Animal Breeding And Genetics, 138(4), 418-431. Https://Doi.Org/10.1111/Jbg.12531

[20]. Ritchie, B. W., Harrison, J. G. And Harrison, R. L. (1994). Avian Medicine, Winger's Publishing, Inc, Florida.
[21]. Samour, J. H. (2008). Avian Medicine (2nd Ed.). Mosby Elsevier.
[22]. Sayed, M.A. M.; R.M. Abu-Elmagd And M. El-Sagheer M. (2024). Effects Of Dietary Prednisolone Supplementation On Egg Production, Complete Blood Count, And Humoral Immunity In Broiler Breeders. Egypt. Poult. Sci. Vol. (44) (Iii): (277-289).
[23]. Sirri F., M. Zampiga, A. Berardinelli And A. Meluzzi (2018). Variability And Interaction Of Some Egg Physical And Eggshell Quality Attributes During The Entire Laying Hen Cycle. Poultry Science, 97 (5): 1818-1823.
[24]. Tvedten, H. (2010). Hematologic Disorders. In R. L. Cowell And R. D. Tyler (Eds.), Small Animal Clinical Diagnosis By Laboratory Methods (5th Ed.). Elsevier.