

CHARACTERISATION OF THE HAEMATOLOGICAL PROFILE OF THE HYBRID B.U.T 6 TURKEY RAISED IN ROMANIA

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Abstract

Part of the research program aimed at the relationship between the morphology and the physiological status of the turkey pineal gland in relation to the state of somatic development and it was performed in SC Galli Gallo Codlea, which is the only breeding and slaughter of turkeys in Romania. Blood determinations were performed on a livestock species important in modern animal breeding sciences, using the biological material from a number of individuals belonging to 30 BUT 6 hybrid raised on permanent litter that can provide knowledge on the relationship widening area of technology growth, modulation of microclimate parameters and growth performance assessed against physiological indicators. Determinations of haematological parameters (WBC, Lym., Neu., Mon., Eo., RBC, MCV, HCT, MCH, MCHC, RDW, Hb) were accomplished with the automatic analyzer based on fluorescence flux cytometry, using laser conductor and hydrodynamic focus. The need for a haematological profile of turkeys lies in the fact that they are characterized by an intense metabolism and possible nutritional imbalances are reflected promptly in their metabolism. Usually, in birds, white series is less used however it can provide essential information on the health of individuals. The determinations showed an average number of leukocytes of $28.47 \times 10^3/\text{mm}^3$, and an average number of erythrocytes of $2.41 \times 10^6/\text{mm}^3$. Results used as reference values in experiments involved modulation of the photoperiod in various age groups. The research showed differences between haematological expressions according to different experimental programmes, the pineal gland having some control over the heterophiles through the melatonin it secretes.

Key words: turkey, haematology, photo-period

INTRODUCTION

Determination of the haematological values realised at turkey hybrid was effectuated to enlighten the health state and the homeostasis of the organism. Establishment of haematological status offers the possibility to track the influence of maintenance conditions through the variations by which those ones offers to the avian practice (nutrition, microclimate parameters, illumination regime).

MATERIAL AND METHODS

Were used a number of 30 individuals with age of 119 days, 15 female and 15 male

belonging to the hybrid B.U.T 6 reared at soil, on a permanent cover of 10 cm thickness.

Microclimate conditions from the rearing shelters were:

- temperature of 16°C
- moisture content 60 %
- lightning programme was of 16L/8D, assured by 24 lamps situated at 2 m height face to soil with a light intensity of 25 lux. Programme of „dark” was between hours 23⁰⁰ – 7⁰⁰ and it is assured by 12 lamps with blue light having an intensity of 15 lux.

Feeding was effectuated “*ad libitum*” with finishing fodder with a raw protein content of 18%, 1% calcium and 0.65% phosphorous.

Blood samples were gathered: election place was represented by the brachial vein, blood being gathered in vacutainer system in

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recipients which use at anticoagulant potassium salt of ethane diamine tetra-acetic acid (K_2 - EDTA). Samples were collected at the same hours to eliminate the variations of haematological compounds due to gathering conditions and circadian rhythm. Due to the distance between the experimental farm and laboratory where the analysis were effectuated, biological samples were preserved by refrigeration at 2-4°C for 6 hours. Before analyse the samples were brought (balanced) at room temperature.

Cellular morphology was effectuated by realisation of coloured smears through May-Grunwald-Giemsa panoptic technique. Cells were studied using objective x 100 (oil immersion).

Determination of leukograms was realised using an automatic analyser.

RESULTS AND DISCUSSIONS

In microscopic filed (Fig. 1), erythrocytes appear like oval cells with homogeneous cytoplasm, eozinophyl. The nucleuses of erythrocytes are placed in centre.

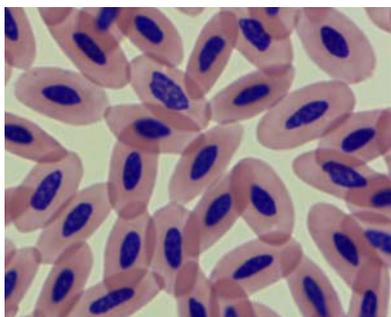


Fig. 1 Aspect of erythrocytes on blood smear
Col May Gründwald Giemsa x100

On smear could be observed round shape erythrocytes (Fig. 2), characteristic to the juvenile, because at turkey erythropoiesis is realised intravascular, reason for why those elements are found in the peripheral blood.

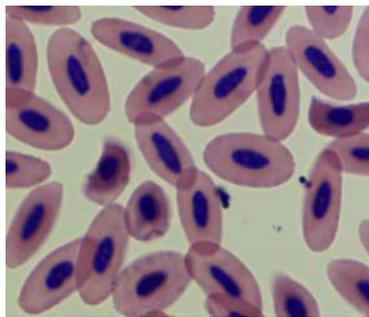


Fig. 2 Artefacts observed on blood smear
Col May Gründwald Giemsa x100

Heterophiles granules (Fig. 3) are eozinophyl, partially covering the nucleus. Cytoplasm is colourless.

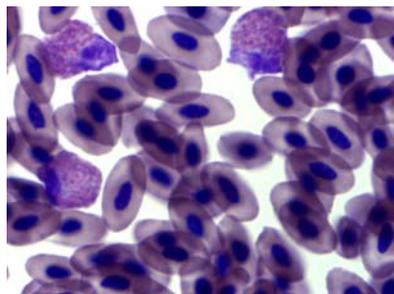


Fig. 3 Heterophiles of turkey
Col May Gründwald Giemsa x100

Eozinophyls are cells with a round shape, with lobately nucleus and light blue cytoplasm. Eozinophyls granules are round to oval having a more intense colour, brighter, that the ones met at heterophiles.

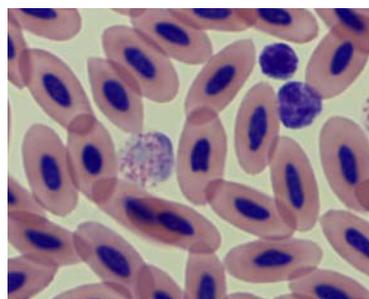


Fig. 4 Eozinophyls of turkey
Col May Gründwald Giemsa x100

Basophiles are round cells which present basophile granulocytes which partially cover the nucleus, cytoplasm being light blue.



Fig. 5 Monocyte of turkey
Col May Gründwald Giemsa x100

Monocytes (Fig. 5) are the greatest leukocytes, are round cells, with laced nucleus and blue-grey vacuolised cytoplasm. In cytoplasm could be found fine azurophilic granulations.

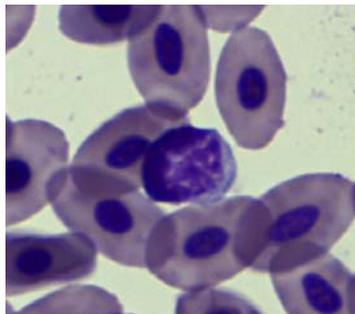


Fig. 6 Lymphocyte of turkey
Col May Gründwald Giemsa x100

Lymphocytes are round cells, having a lower quantity of cytoplasm comparing with monocytes.

At turkey, *Meleagris gallopavo-gallopavo*, males (M) and females (F), the results regarding variations of erythrocytes (RBC), haemoglobin (Hb), hematocrits (Ht), mean erythrocytes volume (VEM), mean erythrocytes haemoglobin (MCH) and average erythrocytes concentration in haemoglobin (CHEM) are presented in table 1.

Table 1 Variation of the total number of erythrocytes and erythrocytes index at B.U.T 6 hybrid

Sex	RBC ($\times 10^6/\text{mm}^3$)	Hb (g/dL)	Ht (%)	MCV (μ^3)	MCH (pg)	MCHC (%)
M	2.42 \pm 0.2	11.22 \pm 0.6	42.3 \pm 1.6	174.4 \pm 19	44.56 \pm 6.3	26.5 \pm 1.0
F	2.82 \pm 0.9	10.07 \pm 0.9	42.7 \pm 1.1	159 \pm 34	40.77 \pm 6.9	25.85 \pm 1.9

Research regarding the haematological values at the studied hybrid, were focused on healthy animals, and kept in the same conditions of rearing and feeding.

It is known that haematological parameters are influenced by breed, age, season, diet, physiological state reason for what we try to work on batches as homogenous as possible to eliminate this drawback.

Due to the variations found in the literature the obtained results will be used as reference values in future research.

In our research variation of total number erythrocytes was between 2.42 $\times 10^6/\text{mm}^3$ at males and 2.82 $\times 10^6/\text{mm}^3$ at females. The obtained values are in the limits cited by Schalm's [4] (2.5-3.5 $\times 10^6/\text{mm}^3$) or cited by Sturkie [5], being a little bit under the limits cited by Pärvu [3] (3.0 \pm 0.5).

For the physiological state the literature presents values more high regarding RBC and Hb at males in comparison with females. This fact was confirmed in our research only for Hb, this one having higher values at males 11.22 g/dL in comparison with females which had an average of haemoglobin of 10.07 g/dL.

Derivate erythrocytes constants, respectively MCV recorded values of 174.4 μ^3 at males and 159 μ^3 at females MCH varied between 44.56 at males and 40.77 at females, and CHEM had very close values between sexes, respectively 25.85 at females and 26.5 at males.

Variation of total number of heterophils and the percentage of heterophils, lymphocytes, monocytes, basophiles and thrombocytes are presented in table 2.

Table 2 Variation of white series at B.U.T. 6 hybrid

Sex	WBC ($\times 10^3/\text{mm}^3$)	Heterophil (%)	Lymphocyte (%)	Monocyte (%)	Eozinophil (%)	Basophile (%)	Thrombocytes ($\times 10^3/\text{mm}^3$)
M	28.6 \pm 8	24.8 \pm 11	68.3 \pm 10	2.8 \pm 1	2.2 \pm 1	0.9 \pm 0.7	34.1 \pm 9
F	20.8 \pm 7	28.4 \pm 9	61.2 \pm 8	3.7 \pm 2	3.0 \pm 2	2.6 \pm 1.2	38.5 \pm 11

Even if some authors consider that the white series at birds don't offer essential information regarding the interpretation of health state, we consider that this one must have a careful attention, having in view a prompt answer in immuniser response of the body.

Basophiles are the first leukocytes which enter in tissues as a part of the earlier inflammatory response at birds and coetaneous basophiles responses could be measured to help to install the immunity.

In interpretation of the total number of leukocytes were obtained mean values between $20.8 \times 10^3/\text{mm}^3$ at females and $28.6 \times 10^3/\text{mm}^3$ at males. Heterophiles are in the first defence cellular line of the body against different stress factors, even if the capacity to generate oxidative metabolites is lower in heterophiles derivates from the respirator tract that the heterophiles from peripheral blood. Heterophiles recorded a mean of 24.8% at males and 28.4% at females. Lymphocytes varied from 61.2 at females to 68.3 at males. Basophiles presented the highest variation limits, obtaining at males a mean of 0.9% and at females 2.6%.

CONCLUSIONS

Necessity of characterization of the haematological profile at B.U.T 6 hybrid of *Meleagris gallopavo-gallopavo* breed reared in Romanian industrial exploitation conditions, results from the reduced volume of physiological characterisations in the described technological conditions.

The general frame for physiological characterisation aimed to modulate the lighting programme with repercussions on husbandry growing and exploitations parameters.

Interdependence of immunological status and physiological response of the hypothalamus – hypophyse – epiphyse axis could be analysed through the haematological sanguine indicators (white series and red series).

The obtained results establish a reference level for the actual rearing conditions of the hybrid in industrial system in Romania.

Were tracked the keeping of the factors in the limits prescribed in the technological guide for growing from the points of view of microclimate factors and nutritive level of the alimentary diet. Lighting regime by its physiological response of indole and peptidic pineal hormones influence the somatic development and establish an immunological level able to protect the organism against aggressions.

The recorded results in the conditions of realising the performances from technological exploitation guide of the B.U.T 6 hybrid offer us the possibility to affirm that the analysed parameters could be consider as reference level.

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REFERENCES

- [1] Foye O. T., Black B. L., 2006 – *Intestinal adaptation to diet in the young domestic and wild turkey (Meleagris gallopavo)*. Comparative Biochemistry and Physiology, 143:184-192
- [2] Law W. A., Payne L.N., 1990 – *The poultry industry*. F.T.W. Jordan, ed. Bailliere Tindall, London, U.K.
- [3] Părvu G, 1992 – *Supravegherea nutrițională metabolică a animalelor*, Ed. Ceres, p 348-350.
- [4] Schalm's, 2010 – *Veterinary Haematology*, sixth edition, Wiley-Blackwell, p 958-966.
- [5] Sturkie P.D., 1976 – *Avian Physiology*, Springer-Verlag, p 54-59.
- [6] Vatn S., Framstad T., Torsteinbø W. O., 2000 – *Haematologic evaluation of normal and anemic lambs with the Technicon H*1 using EDTA or heparin as anticoagulants*, Vet. Clin. Pathol., vol.29, p.62 – 68.
- [7] Kheiri F., Rahmani H. R., 2006 – *The effect of reducing calcium and phosphorous on Broiler performance*, International Journal of Poultry Science, vol. 5(1), p. 22 – 25.