



Hematological aspects of the Galați players pigeon breed

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Abstract. In this paper, we propose a study on updating the theoretical and practical knowledge of the Romanian pigeon breed Galați players. The aim of the research is to make an extensive study on the variability of the conformation and constitution characters existing within the "Galați players" breed to see the limits of variability and its use in the selection process. The study of the biochemical and haematological profile function of color variety will allow to establish possible correlations with the phenotypic diversity of the breed, and the flying and playing skills, while the genetic biodiversity is maintained. Hematological investigations are part of any protocol that shows the health status of the investigated organism.

Key Words: bird hematology, analysis, health state, stem cells, embryogenesis.

Introduction. The different types of cells that are blood constituents, descends from mesodermal origin stem cell. During the embryogenesis, there are two different processes concerning the figurative elements (Brandon et al 2000).

In embryos the hematopoietic cells appears in form of "blood islands". This cell aggregates comes from mesodermal cells, which, during the gastrulation process have migrated in extra-cellular regions. The progenitor hematopoietic cells provide circulating figurative elements for the developing embryo.

Shortly after this, the dorsal embryonic mesoderm contributes to the second stage of figurative elements formation. These progenitor hematopoietic cells, originated form the embryo, will produce myeloid and lymphoid lineages of blood cells, which provide the necessary material for haematopoiesis in adult individuals.

The volume of blood in healthy pigeons varies between 6 and 11 mL/100 g body weight (Sturkie 1965), and considering a bird with an average weight of 250 g, which would have 15-27.5 mL blood, which of 10% (1.5-2.7 mL) can be harvested without any side effects. However a quantity of 0.2-0.5 mL of blood is enough to perform haematological examination.

Pigeons, compared to other species, support better blood loss due to their more efficient mechanism responsible for cell fluids mobilization.

It is a general rule that from a healthy bird can be harvested a blood quantity equal with its 1% body weight, without having any side effects. However, must consider, that in case of birds with clinical sigh of illness, the harvested blood quantity must be below the healthy individuals limit (Clark et al 2009; Wakenell 2010).

Although similar studies concerning hematology of pigeons have been performed (Peinado et al 1992; Lashev et al 2009; Tawassul 2011; Oznurlu et al 2012; Ihedioha et al 2016), studies on the Galați players pigeon breed cannot be found in the literature.

Some previous studies concerning phenotypic characterization of the "Galați players" pigeon breed which constitutes the present study biological material have been performed in 2015 by Ionescu & Oroian (2015) and Ionescu et al (2015).

The present study aims to study the biochemical and hematological profile of the Galați players pigeon breed, function of color variety, in order to establish eventually phenotypic correlations within the breed.

Material and Method. The biological material consisted of 102 pigeons of "Galați players" breed of different color varieties according Table 1.

Table 1

The biological material which have been the subject of research

Specification	Blue flacked white		White unicolor		Black flacked white		Red flacked white	
	♂	♀	♂	♀	♂	♀	♂	♀
Total number of studied individuals	17	17	8	7	18	18	9	8
Total number of hematological studied individuals	3	2	3	2	3	2	2	3

Blood harvesting in birds often presents difficulties due to their dispersion in terms of body size. For hematological examinations, in pigeons as well as in mammals, it is recommended to access the bloodstream a superficial blood vessel.

Election sites for blood sampling are right jugular vein, axillary vein, tibial vein and basilar vein. The method of blood harvesting and the election place varies from species to species.

In the pigeon, it is preferred the axillary vein as election site because it is more difficult to harvest from other veins.

An important factor to be taken into account when taking blood samples from small birds is the hemorrhage; the pigeon is also included in this category.

The amount of retained heparin may vary from one sample to another, any excess amount may dilute the sample (important in the case of low volume samples) and may interfere with certain determinations, such as determination of natremia and proteinemia (Hochleithner 1994).

Blood samples for biochemical investigations were obtained prior to acclimatic examination to avoid iatrogenic changes

The processing of blood samples has been facilitated in recent years by the occurrence of automated counting methods of figurative elements, methods which in the past were limited to the erythrocyte count.

Although automated sample processing methods have made progress on the precision of the determinations, they may present errors due to the particularities of the bird figurative elements. A study on *Chlamydotis macqueenii* showing chronic inflammation (caused by wing trauma due to repeated hitting the walls of a room), resulted mean thrombocyte values were $9.22 \pm 0.21 \mu\text{m}$ in length and $8.10 \pm 0.19 \mu\text{m}$ wide compared to $5.47 \pm 0.12 \mu\text{m}$ in length and $4.96 \pm 0.10 \mu\text{m}$ in healthy birds.

By using modern methods of automated analysis, samples may sometimes have serious errors due to the fact that no automated analyzer can make the difference between megatrombocytes and lymphocytes.

Blood samples are recommended to be processed within 3-4 hours from collection. If this is not possible, the samples harvested in the decanter can be chilled to 2-12°C for 24-48 hours. Exposure to extreme environmental conditions or excessive homogenization may affect the quality of the sample.

Often, the amount of blood samples available for analysis is low, thus it is indicated that blood smear is prioritized, allowing for the analysis of cell morphology and the presence of hemoparasites followed by hematocrit, leucocyte count, hemoglobin and erythrocyte count.

Results and Discussions. Experimental methods performed are presented below, with descriptions of the observations and determinations made. There are reported the modalities of performing hematological parameters determination, blood biochemistry, cell viability assessments, the number of pigeons studied by sexes and the number of pigeons studied, and the used methods.

Table 2

Average and individual values of erythrocyte parameters of two pigeon batch

Batch no.	Hematocrit (%)	Hemoglobin (g/dL)	Erythrocyte (T/L)	Erythrocyte average constants		
				VEM (fL)	HEM (pg)	CHEM (g/dL)
Bach 1						
1	40.00	4.80	2.87	139.37	16.72	12.00
2	45.50	11.30	3.88	117.27	29.12	24.84
3	38.70	8.80	3.63	106.61	24.24	22.74
4	41.72	9.40	2.79	149.53	33.69	22.53
5	48.00	6.40	3.92	122.45	16.33	13.33
Average	42.78	8.14	3.42	125.87	25.35	21.74
Standard deviation	3.47	2.29	0.49	14.34	6.89	7.67
Bach 2						
1	53.63	12.80	3.25	165.02	39.38	23.87
2	44.54	6.80	2.15	207.16	31.63	15.27
3	48.33	13.90	3.03	159.50	45.87	28.76
4	50.00	9.88	3.15	158.73	31.37	19.76
5	40.00	7.20	3.12	128.21	23.08	18.00
Average	40.50	8.36	2.70	138.64	28.22	18.84
Standard deviation	13.82	3.45	0.85	49.52	11.10	6.07
Ref. (Gylstorff 1983)	3.10-4.50	10.60-14.70	42.50-50.00	117.00-260.00	39.00-83.00	23.00-41.00

Table 3

Average and individual values of leukocyte parameters of two pigeon batch

Batch no.	Leucocyte (G/L)	Leucocyte formula				
		Heterophils	Eosinophils	Basophils	Lymphocytes	Monocytes
		%	%	%	%	%
Bach 1						
1	17.50	42.00	4.00	0.00	43.00	11.00
2	18.00	41.00	8.00	0.00	40.00	11.00
3	17.00	38.00	4.00	0.00	40.00	18.00
4	16.00	42.00	4.00	0.00	35.00	19.00
5	16.00	47.00	6.00	0.00	30.00	17.00
Average	16.90	42.00	5.20	0.00	37.00	15.20
Standard deviation	0.89	3.24	1.79	0.00	0.90	3.90
Bach 2						
1	15.50	30.00	1.00	0.00	39.00	30.00
2	25.50	42.00	1.00	0.00	47.00	10.00
3	13.00	35.00	4.00	0.00	37.00	24.00
4	16.50	43.00	2.00	0.00	47.00	8.00
5	17.50	36.00	0.00	0.00	51.00	13.00
Average	17.60	37.20	1.60	0.00	44.20	17.00
Standard deviation	4.72	5.36	1.52	0.00	5.93	9.54
Ref. (Gylstorff 1983)	19.80-32.60	19.80-32.60	1.50-2.70	-	45.00-75.00	8.10-16.50

A recent similar study concerning hematological profile of the domestic pigeon determined using standard methods conducted by Ihedioha et al (2016) on a batch of 64 of the pigeons (34 females and 30 males – originating from three different locations) after two weeks of acclimatization reported overall mean values as follows: packed cell volume (PCV) – $44.54 \pm 4.73\%$; haemoglobin concentration (Hb) – 12.89 ± 1.55 g/dl; red blood cell (RBC) count – 3.34 ± 0.38 ($10^6/\mu\text{L}$); mean corpuscular volume (MCV) – 133.86 ± 19.37 fl; mean corpuscular haemoglobin (MCH) – 38.67 ± 5.34 pg; mean corpuscular hemoglobin concentration (MCHC) – 28.97 ± 2.59 g/dl; leukocyte counts ($10^3/\mu\text{L}$): total leukocyte – 23.36 ± 7.06 ; lymphocyte – 10.66 ± 3.49 , heterophil – 7.80 ± 2.89 , monocyte count – 2.32 ± 0.93 , eosinophil count – 2.25 ± 0.89 , and basophil – 0.24 ± 0.30 . Concerning all the haematological parameters evaluated there were no significant differences ($p > 0.05$) reported between males and females and the body weights. However significant variations ($p < 0.05$) were found in the PCV, absolute heterophil, monocyte and basophil counts, percentage lymphocyte, eosinophil and basophil counts of the pigeons from the three location.

Lashev et al (2009) reported high haemoglobin concentration, and respectively high red blood cell counts in pigeons.

Conclusions

- ✓ Age, sex, altitude, nutrition, and lying can cause variations in biochemical parameters.
- ✓ In the study performed on pigeons subject to continuous manipulation, elevated creatine phosphokinase and glycemic values and decreased uric acid was observed.
- ✓ The blood volume of healthy birds varies between 6 and 11 mL/100 g body weight.
- ✓ However, an amount of 0.2-0.5 mL of blood is sufficient for performing haematological examinations.
- ✓ By periodic determination of biochemical parameters, the health status can be assessed even in large flocks of birds. Birds possess a high degree of compensation, which allows them to blur the clinical signs of disease in the early stages.

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