

RESEARCH ARTICLE

The Immunological Reactivity of Turkeys of Different Genotypes on the Action of Environmental Factors

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The level of general immunological reactivity of birds can be judged by the concentration of leukocytes in the bloodstream. The number of white cells is associated not only with the level of defense of the body of turkeys, but also with its reactivity to environmental factors, determining the activity and direction of metabolic processes. The purpose of the work is to study the characteristics of the immunological reactivity indices of turkeys of different origin and crosses in dynamics depending on age. Assessment of the physiological state of turkey poults during cultivation under industrial conditions by the variability of morphological blood parameters and the level of immunological reactivity showed, that they all fluctuate within the normal range. At the same time, the value of blood parameters depends on the age of the bird and the genotype, determined by both the breed and the cross. The level of immunological reactivity of turkeys, due to the number of leukocytes in the blood, depends on age and cross-country. According to this indicator, birds of medium (group I) and heavy crosses of the White broad-chested breed are superior to individuals of medium crosses Hybrid Greyd Maker (III group) and heavy crosses Hybrid Converter (IV group) by 3.04-14.47% depending on age.

Keywords: Turkey; Cross; Age; Blood; Immunological reactivity; Environment

Introduction

Poultry farming today is a steadily growing livestock industry that occupies a key position in the production of meat and eggs (Cetin, et al., 2005; Khabirov et al., 2020; Sydykova et al., 2019). This is due to the ability of poultry to convert the resulting substances of plant and animal origin into food for humans with high biological and nutritional value (Jezdimirovic et al., 2019; Ognik et al., 2016; Okuskhanova et al., 2017; Swain & Johri, 2000) One of the paramount tasks for poultry workers is to provide the population with food needs (Podolian, 2017). To accomplish this task, it is necessary to develop a quality raw material base, introducing new growing technologies and improving the genetic characteristics of poultry (Abdelrahman, 2013; Hoehler et al., 2005; Jankowski et al., 2019).

Nonspecific protective factors are innate, their action is directed against all microorganisms (Chachaj et al., 2019; Kubinska et al. 2014). The occurrence, course, and outcome of the disease to a large extent depend on the background state of activity of these nonspecific protection factors (primarily, on the nature of the migration of leukocytes to the focus of inflammation), their lability, and the adequacy of the response (antigenic stimulation) (Czech et al., 2014; Igenbayev et al., 2019; Khabirov et al., 2020; Kubinska et al., 2015; Zdunczyk et al., 2017). Specific and nonspecific mechanisms are aimed at eliminating foreign antigenic material from the body and are closely interconnected (Khabirov et al., 2020; Sharipova et al., 2017).

The infectious process develops against the background of a decrease in the body's resistance due to a change in the body's reactivity (non-specific, immunological) when exposed to stress agents, antibiotic therapy, vitamin deficiency, poor nutrition, in an unfavorable environmental situation (Dunaievskaya, 2018; Ognik et al., 2012; Okuskhanova et al., 2019; Sobolev, 2019; Szabó et al., 2005; Tykałowski et al., 2009; Sharipova et al., 2017).

The level of general immunological reactivity of birds can be judged by the concentration of leukocytes in the bloodstream. The number of white cells It is associated not only with the level of the body's defenses, but also with its reactivity to environmental factors, determining the activity and direction of metabolic processes (Khabirov et al., 2020; Kubinska et al., 2016; Okuskhanova et al., 2017; Tykałowski et al., 2014). White blood cells perform not only a protective role (they recognize and neutralize foreign

components, including viruses and bacteria), but also trophic and transport functions, determining the state of metabolic processes in birds (Khabirov et al., 2020; Ognik et al., 2016).

To assess the clinical status of birds using the level of immunological reactivity, namely the number of leukocytes.

The aim of the work was to study the characteristics of the immunological reactivity of turkeys of different origin and crosses in dynamics depending on age.

Materials and Methods

We selected 4 groups of turkey poults at a daily age of 30 animals each (Table 1) on the basis of analogues.

Table 1. Breed groups of turkeys in the experiment Group.

Nº Groups	Breed group (cross)	Slaughter age, days
I	White broad-chested (medium cross)	120
II	White broad-chested (heavy cross)	150
III	Hybrid Grad Maker (medium cross)	120
IV	Hybrid Converter (heavy cross)	150

Blood was examined at the age of 30, 60, 90 and 120 days from 5 goals from each group. The number of leukocytes was determined on a DIATRON Abacus automatic hematology analyzer (according to the approved methodology of this device).

Results and Discussion

Data on the content of leukocytes are presented in Table 2.

Table 2. The content of leukocytes in the blood of turkeys (n=30), $X \pm Sx$.

Index	Age, day	Groups			
		I	II	III	IV
Erythrocytes, 1012/l	30	2,49 ± 0,01	2,46 ± 0,10	2,17 ± 0,13*	2,10 ± 0,22*
	60	2,62 ± 0,09	2,63 ± 0,15	2,38 ± 0,13	2,27 ± 0,17
	90	2,85 ± 0,13	2,87 ± 0,14	2,42 ± 0,09	2,36 ± 0,13
	120	2,96 ± 0,14	2,90 ± 0,16	2,61 ± 0,11	2,53 ± 0,16
White blood cells, 109/l	30	17,85 ± 0,47	17,63 ± 0,43	17,12 ± 0,20	17,11 ± 0,65
	60	19,36 ± 0,38	18,94 ± 0,48	18,74 ± 0,45	18,13 ± 0,44
	90	20,31 ± 0,43	19,87 ± 0,21	18,53 ± 0,38*	18,25 ± 0,51*
	120	20,14 ± 0,56	20,13 ± 0,18	17,98 ± 0,53*	17,62 ± 0,49*

Note: * - $P \leq 0.05$ compared with the control. The norm for adult turkeys: white blood cells - 20-40 · 109/l.

The number of leukocytes in the blood of birds steadily increased during their industrial cultivation, although it was unreliable (Table 2). The increase in the level of cells from 30 to 120 days of age in turkey poults of the middle cross-country of the White broad-breasted breed (group I) and the heavy cross-country of the White broad-breasted breed (group II) was 12.83 and 14.18%. At the same time, in individuals of the middle cross Hybrid Greyd Maker (group III) and heavy cross Hybrid Converter (IV group) the number of leukocytes is practically it was independent of age and ranged between 17.12–18.74 and 17.11–18.25 109/L. Consequently, the age of turkeys influenced the level of immunological reactivity of the organism to the environment.

In the early stages of postnatal ontogenesis (at 30 and 60 days of age), the variability of leukocytes in the bloodstream was practically independent of the bird genotype. The content of white cells in 30-day-old turkey poults ranged from 17.11-17.85 109/l, and in 60-day-old turkeys – from 18.13 to 19.36 109/l. Differences in immune status appeared in birds by the age of 60 days, which is associated with the formation of the functional activity of leukopoiesis organs. Thus, turkeys of groups I and II at the age of 90 exceeded their analogues from groups III and IV in terms of the number of leukocytes by 9.61-11.29 and 7.29-8.87%, and at the age of 120 days by 12.01-14, 90 and 11.95-14.25%. Consequently, birds of medium and heavy crosses of the White broad-chested breed had a higher level of protective forces at the end of the growing period than the average cross-breed Hybrid Grader Maker and the heavy cross Hybrid Converter. To assess the role of red blood cells and white blood cells in the growth and development of turkeys of different groups under industrial conditions, we calculated the ratio between these cells in the corresponding age periods cells steadily increased (Figure 1).

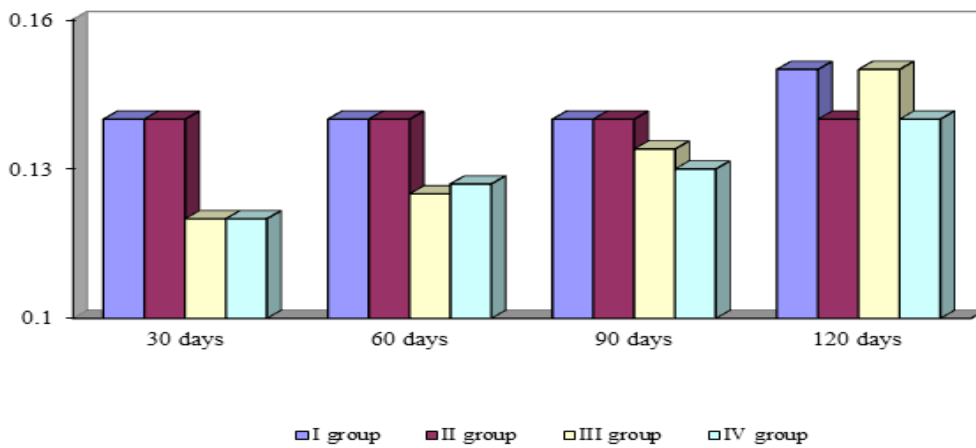


Figure 1. The relationship between red blood cells and white blood cells (conventional units) in birds of the experimental groups.

Their analysis showed that in the body of medium and heavy crosses of the White broad-breasted breed, the ratio between the number of red and white blood cells did not depend on age, i.e., the proliferative activity of erythropoiesis and leukopoiesis was equivalent to the functional capabilities of the physiological systems of the body. In turkey poultry, medium cross-country Hybrid Grader Maker and heavy cross-country Hybrid Converter, the ratio of the number of red blood cells and white blood technological cycle due to the predominant increase in the number of red cells in the bloodstream. Consequently, during the growth of birds of groups III and IV, the intensity of aerobic redox processes increased, providing the functional and metabolic needs of cells of organs and tissues and creating the basis for faster growth and development.

Conclusion

Assessment of the physiological state of turkey poults during cultivation under industrial conditions by the variability of morphological blood parameters and the level of immunological reactivity showed that all of them fluctuate within normal limits. At the same time, the value of blood parameters depends on the age of the bird and the genotype, determined by both the breed and the cross. The level of immunological reactivity of turkeys, due to the number of leukocytes in the blood, depends on age and cross-country. According to this indicator, birds of medium (group I) and heavy crosses of the White broad-chested breed are superior to individuals of medium crosses Hybrid Greyd Maker (III group) and heavy crosses Hybrid Converter (IV group) by 3.04-14.47% depending on age.

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