RESEARCHES CONCERNING THE MAIN BLOOD PARAMETERS OF CHICKEN BROILERS FED WITH A NEW GROWTH PROMOTER - AT

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Rezumat

Cercetările s-au desfăşurat în cadrul biobazei Facultăţii de Zootehnie a Universităţii de Ştiinţe Agricole şi Medicină Veterinară „Ion Ionescu de la Brad" Iaşi, pe un număr de 250 pui broiler de găină, în vârstă de o zi, repartizaţi pe 4 loturi a câte 50 capete fiecare, din care un lot de control – Lc1 şi patru loturi de experienţă (LE1 - LE4). Conform planului experimental, în alcătuirea nutreţurilor combinate destinate puilor broiler de găină „Ross 308" studiaţi, s-a folosit biostimulatorul de creştere „AT", în doze de: 3% la lotul LE1; 5% la lotul LE2; 7% la lotul LE3 şi 9% la lotul LE4. Pentru determinările hematologice s-au recoltat câte 10 probe/lot, înainte de sacrificarea puilor, la vârsta acestora de 42 zile. În vederea evitării oricărui proces de denaturare a probelor individuale s-a folosit un instrumentar adecvat şi s-au utilizat recipienţi corespunzători, sterilizaţi şi ermetizaţi (sistemul „vacutainer"). Principalele constante sangvine studiate au fost: hematocritul, hemoglobina şi numărul de eritrocite. Ele s-au încadrat în limite normale, citate de literatura de specialitate. În plus, s-a constatat că introducerea în hrana puilor broiler de găină a „biostimulatorului de creştere AT" a determinat realizarea unor indici hematologici superiori celor înregistraţi la lotul de control; de exemplu, hematocritul a fost mai ridicat cu 0,34-4,46%; hemoglobina cu 7,05-10,58%, iar numărul de eritrocite cu 3,57-14,28%.

Cuvinte chei: hematocrit, hemoglobină, eritrocite, pui broiler, biostimulator

Abstract

The researches have been organized within the experimental farm of the Animal Science Faculty, part of the „Ion Ionescu de la Brad" Iaşi University of Agricultural Sciences and Veterinary Medicine, using a flock of 250 day old chicken broilers, randomly allocated to 5 groups of 50 capitis each, meaning a control group – Lc1 and four experimental groups (LE1-LE4). According to the experimental design, the "Ross 308" broilers have been fed with mixed feed added with different concentrations of "AT" bio-growth promoter: 3% in LE1 group; 5% in LE2 group; 7% in LE3 group and 9% in LE4 group. 10 blood samples/group have been taken for hematological analysis, prior to chickens slaughtering at 42 days old. In order to avoid any alteration process of the individual samples, certain instruments and appropriate recipients have been used after sterilization ("vacutainer" recipient). Main blood parameters have been analyzed: hematocryte, hemoglobin and erythrocytes amount. They have found within normal limits, also quoted in literature. Moreover, it was found that the usage of the "AT growth promoter" in chicken feeding induced better blood parameters in experimental treatments, compared to the control group: 0.34-4.46% higher hematocryte; 7.05-10.58% higher hemoglobin and 3.57-14.28% more erythrocytes.

Key words: hematocryte, hemoglobin, erythrocytes, chicken broiler, bio growth promoter

INTRODUCTION

The researches related to the usage of certain bio-stimulating products as nutritional facts involved in growth and feed conversion enhancement of chicken broilers are a current practice worldwide. Within this conjuncture, we proposed to study the blood parameters dynamics of those chicken broilers which consumed mixed feed (m.f.) added with "AT bio-growth promoter".

MATERIAL AND METHODS

The researches have been carried out within the Experimental farm of the Animal Science Faculty, part of the „Ion Ionescu de la Brad" Iaşi University of Agricultural Sciences and Veterinary Medicine, using 250 day old chicken broilers, divided in 5 groups of 50 capitis each, meaning a control group – Lc1 and four experimental treatments (LE1 - LE4) (*tab. 1*).

Table 1. **Experimental design**

Groups	Amount of chickens per group	Experiment duration (days)	Used feed across periods of		
			Starter*	Grower*	Finisher*
Lc1	50	42	m.f.**	m.f.**	m.f.**
LE1	50	42	m.f. with 3% AT	m.f. with 3% AT	m.f. with 3% AT
LE2	50	42	m.f. with 5% AT	m.f. with 5% AT	m.f. with 5% AT
LE3	50	42	m.f. with 7% AT	m.f. with 7% AT	m.f. with 7% AT
LE4	50	42	m.f. with 9% AT	m.f. with 9% AT	m.f. with 9% AT
Studied indices:					
Blood parameters: - hematocryte (%); - erythrocytes amount (mil./mm^3 blood); - hemoglobin quantity (g/100 ml blood).					

*Notice: * starter 1-10 days; growing period 11-24 days; finishing period 25-42 days;*
*** mixed feed appropriate to each technological period*

The chicken broilers we used in our experiment belonged to the "Ross 308" hybrid and they have been accommodated into a BP-4 type cage battery, since day old till slaughtering, at 42 days.

The used feed meant complete mixed feed (energetic, vegetal proteic, animal proteic, minerals feedstuffs, premixes and synthetic feedstuffs).

According to the experimental design the feed used for "Ross 308" chickens comprised the *"AT growth promoter"*, in proportions of 3% for LE1 group; 5% for LE2 group; 7% for LE3 group and 9% for LE4 group.

The AT bio-promoter is an indigenous product, resulted during B_{12} vitamin fabrication, after a culture environment filtration. Besides the main product - B_{12} vitamin – it results a thin dust dark brown colored, which contains the microorganism and part of the cultural environment. The microorganisms used for B_{12} vitamin synthesis are *Bacillus megaterium, Streptomyces griseus, Streptomyces aureofaciens, Streptomyces olivaceus* and *Streptomyces fradiae*, while the cultural environment comprises molasses and minerals (*Simeanu D., 2004, Simeanu D. et al., 2005*).

The mixed feed recipes have been formulated as isoenergetic and isoproteic, while their nutritional features have been slightly similar to the recommendations of the "Ross Breeders" company in Great Britain for the "Ross-308" hybrid.

Hematocryte (%), as the most precise index for the anemia or polycitemia status assessments, has been appreciated through the *microhematocryte* method, based on the centrifugal separation of the erythrocytes from plasma, in order to do a relative ratio between

erythrocytes and whole blood volume. The readings have been run on the scale attached to the device (*Price S.E.H et al., 1998)*.

Hemoglobin (Hb/100 ml blood) was assessed through the method using Drabkin reagent, all the hemoglobin types in blood sample transform in cyanmethemoglobin, a steady product which could be measured via photometry and read at spekol device, knowing that its wavelength is 540 nm moved in comparison to the Drabkin solution (*Maxwell H.M., 1991)*.

The assessment of **erythrocytes amount** (mil./mm^3 blood), relevant for anemia detection and especially of those oligocytemic types, consisted in their *microscopic direct counting* into an isotonic liquid environment, precisely known.

For erythrocytes amount reading the Cosma dilution liquid has been used: natrium chloride 1g, mercury dichloride 0.8 g, natrium citrate 0.3 g, ammonium oxalate 0.1 g, distilled water 100 ml.

The counting has been done using a hemocytometer composed of Potain pipette and of Burker-Turk counting chamber *(Cochet Nelly, 1994)*.

Erythrocytes amount have then been calculated using the relation:

$$X= N \times I \times D \times S/n,$$

where: X= whole amount of erythrocytes/mm^3 blood; N= sum of the counted erythrocytes; I= height of counting chamber (10); D= used dilution (1/200); S=area of a 3rd order square (1/400); N=amount of scanned squares (80).

Ten samples/group have been taken to run blood assessments, prior to chickens slaughtering, at 42 days old.

In order to avoid any alteration on the individual blood samples, we used appropriate sampling instruments and preserving recipients, sterilized and sealed ("vacutainer" system).

RESULTS AND DISCUSSIONS

Concerning the *hematocryte* values, they have been situated within normal limits as quoted in the scientific literature (*Pârvu Gh., 1992; Chelaru Ana et al., 1997, 1998; Constantin N. et al., 1998, 1999*) (26±4.0); the lowest values were found in the control group, therefore the differences were significant versus LE2 group, respectively distinguished significant versus LE1 and LE3 groups (*tab. 2* and *fig. 1*).

Table 2. **Statistical estimators and their significance for the hematocryte (%)**

Notice	Groups				
	Lc1	***LE1***	***LE2***	***LE3***	***LE4***
n	10	10	10	10	10
$\bar{x} \pm s\bar{x}$	29.1 ± 0.29	30.2 ± 0.17	29.2 ± 0.27	30.4 ± 0.32	28.9 ± 0.39
V%	3.00	2.00	3.00	3.00	5.00
Significance	-	**	*	**	*

*Notice: * - significant differences, ** - distinguished significant differences.*

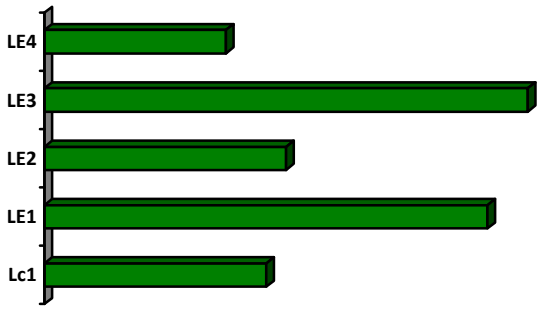

Fig. 1. **Hematocryte values (%) in the studied chicken broilers**

Data presented in *table 2* show lower values for the variation coefficient (<10%) in all experimental groups.

Although the values were comprised within the limits specified by literature, in control groups occurred higher values, meaning an improvement of the health status for those chickens which consumed the studied additive.

Hemoglobin (Hb) is the main blood pigment involved in superior animals respiration, which give the blood red color, through the bivalent iron within. Hemoglobin is almost exclusively found into the erythrocyte cytosol and could be 99.95% extracted (*Bell and Freeman, 1971; Gross W.B., 1984; Gociu Mariana et al., 1985; Manolescu N., 1999*), without alterations of the cell membrane. Each erythrocyte contains environ $3x10^8$ Hb molecules or 27-34 pg Hb, in gravimetric units. The usage in feed of those compounds with high impact on erythropoesis induced us to quantitatively assess the hemoglobin existing in blood. Therefore, *table 3* and *figure 2* reveal the values of hemoglobin quantities found in control and experimental groups.

Table 3. **Statistical estimators and their significance for hemoglobin values (g/100ml of blood)**

Notice	Groups				
	Lc1	***LE1***	***LE2***	***LE3***	***LE4***
n	10	10	10	10	10
$\bar{x} \pm s\bar{x}$	8.50 ± 0.18	9.20 ± 0.17	9.30 ± 0.16	9.40 ± 0.18	9.10 ± 0.18
V%	7.00	6.00	5.00	6.00	6.00
Significance	-	*	**	**	*

*Notice: * - significant differences, ** - distinguished significant differences.*

From the data specified in table 3 and figure 2, it resulted that the achieved values are closely situated to the normal ones, published in literature (*Dunnington E.A. et al., 1987; Ghergariu S., 1995; Constantin N. et al., 1999*). Significant differences occurred between LE1 – LE4 group, while for the LE2 – LE3 comparisons, the differences were found distinguished significant.

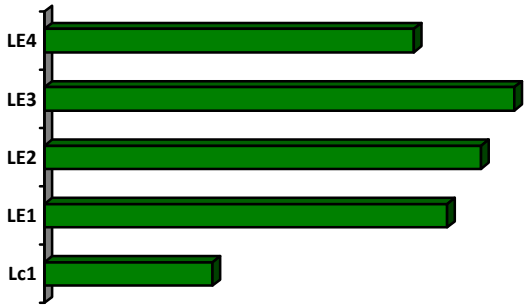

Fig. 2. **Hemoglobin values (g/100ml of blood) in studied chicken broilers**

Erythrocytes amount should minimally vary under normal conditions, as a consequence of the dynamic adaptation between erythropoesis and erythrolisis rates. The researches revealed a slight increasing of the erythrocytes amount in all experimental treatments, compared to the data found in scientific references (2.35±0.25 mil./mm^3 blood) (*Maxwell H.M., 1991; Chelaru Ana et al., 1998*) (*tab. 4* and *fig. 3*).

Erythrocytes appearance did not have sensible alterations between the control group and the experimental ones.

The usage of AT bio-promoter in chicken broiler feeding led to the achievement of better hematological indices, positively influencing hemoglobin quantity and erythrocytes blood amount.

Table 4. **Statistical estimators and the significance for the erythrocytes amount parameter (mil./mm^3 blood)**

Notice	Groups				
	Lc1	***LE1***	***LE2***	***LE3***	***LE4***
N	10	10	10	10	10
$\overline{X} \pm s\overline{X}$	2.80 ± 0.07	3.20 ± 0.12	3.00 ± 0.07	3.10 ± 0.09	2.90 ± 0.12
V%	8.00	12.00	7.00	9.00	13.00
Significance	-	*	*	*	ns

*Notice: ns – not significant; * - significant differences.*

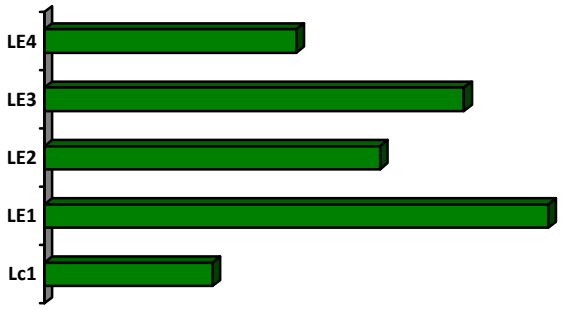

Fig. 3. **Erythrocytes amount (mil./mm^3 blood) in studied chicken broilers**

CONCLUSIONS

Main blood parameters we studied were the hematocryte, the hemoglobin and erythrocytes amount. They have been within normal limits, as quoted in literature. Moreover, the usage of AT growth promoter in chicken feeding induced better hematological indices in experimental treatment, compared to the control one – the hematocryte was 0.34-4.46% higher, the hemoglobin 7.05-10.58% higher, while the erythrocytes amount passed over 3.57-14.28%.

It could be stated as main conclusion that the usage of AT growth promoter produced better health condition in chicken broilers fed with it.

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