

The influence of 1,2,4-triazole and 5-oxo-1,2,4-triazine derivatives on some blood and performance indices of turkey hens

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ABSTRACT

The experiment was carried out on 6-week-old Big-6 turkey hens receiving 1,2,4-triazole or 5-oxo-1,2,4-triazine derivatives as additives to drinking water for ten weeks. The aim of the study was to determine the influence of the tested compounds on some immunological and haematological parameters of blood and on performance of turkey hens.

The results showed that the examined substances did not significantly affect the immune response of turkey hens, although all immunological parameters in the group receiving 5-oxo-1,2,4-triazine were slightly better than in the control group. Moreover, the 5-oxo-1,2,4-triazine supplement caused an increase in the RBC count, Ht and Hb levels. Administration of both tested derivatives slightly improved the performance of the birds.

KEY WORDS: turkey hens, blood, 1,2,4 triazole, 5-oxo-1,2,4-triazine

INTRODUCTION

One of the most active areas of research in recent years has focused on finding new additives stimulating immune reactions and improving performance of animals (Engstad and Raa, 1999; MacDonald, 2000; Grela et al., 2001). The 1,2,4-triazole and 5-oxo-1,2,4-triazine derivatives are newly synthesized compounds having anti-inflammatory, antibacterial and antifungal properties (Modzelewska-Banachiewicz and Matosiuk, 1999; Modzelewska-Banachiewicz and Kamińska, 2001). Their immunotropic and antioxidant activity is being intensively tested (Ognik et al., 2004).

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The aim of these investigations was to determine immune response and results of rearing of turkey hens treated with 1,2,4-triazole and 5-oxo-1,2,4-triazine derivatives.

MATERIAL AND METHODS

The experiment was carried out on 60 six-week-old Big-6 turkey hens divided into 3 groups (20 birds per group). The birds were raised until 16 weeks of age. The hens were kept under standard conditions with free access to feed (standard full-ration mixtures) and water. Group I was the control. Birds of group II received the 1,2,4-triazole derivative with drinking water, 100 µg/ head/day, group III - 5-oxo-1,2,4-triazine in the same dose. On days 28 and 70 of the experiment, blood samples (from 8 birds) were taken for haematological and immunological tests. Ht and Hb content, WBC number and leucogram were determined using conventional methods. The phagocytic activity of heterophils was assessed using the *Staphylococcus aureus* phagocytosis test and the nitrotriazolium blue (NBT) reduction test (Park, 1968). The serum lysozyme level was determined with the turbidimetric method (Siwicki, 1993).

The birds were weighed at the start of the experiment, in the middle of it, and at slaughter. Based on the production results, the Index of Rearing Effectiveness (WEO) was calculated.

$$\text{WEO} = \frac{\text{mean body weight after rearing (kg)} \times \text{liveability (\%)} \times 100}{\text{day of rearing} \times \text{feed conversion (kg kg}^{-1}\text{)}}$$

Statistical analysis was performed using Statistica v. 5.0 software. Differences at $P \leq 0.05$ were considered significant.

RESULTS AND DISCUSSION

During the experimental period all of the birds were in good physical condition and no mortality was recorded. The body weight of the birds in all of the groups at 12 and 16 weeks of life did not differ significantly (Table 1). After ten weeks of the experiment, the turkey hens of group II (supplemented with 1,2,4-triazine) weighed about 2.5% more, and those of group III (receiving 5-oxo-1,2,4-triazine), about 3.2% more than the control group. Feed conversion in the experimental groups was about 2.5% (III) and 3.1% (II) better in comparison with the control. The slightly better results of rearing achieved in the experimental groups might result from the bacteriostatic and antiviral properties of the administered additives (Modzelewska-Banachiewicz and Kalabun, 1999; Modzelewska-Banachiewicz and Kamińska, 2001).

TABLE 1

Performance of turkey hens

Item	Feeding groups			SEM
	I	II	III	
Body weight, kg				
6 weeks	2.36	2.24	2.21	0.08
12 weeks	7.08	7.26	7.74	0.12
16 weeks	9.48	9.72	9.78	0.13
Feed conversion, kg kg ⁻¹	2.80	2.71	2.74	
WEO, points	483.60	512.30	511.70	

Analysis of blood (Table 2) showed that the addition of 5-okso-1,2,4-triazync caused an increase ($P \leq 0.05$) in the RBC count, Ht and Hb levels. However, they still remained within normal physiological limits (Krzyszowski, 1983). There were no significant differences among the groups in relation to WBC number and leucogram. Since more obvious changes of the studied indices values appeared at the end of the experiment (in the second blood sampling), the results of the first one were omitted.

TABLE 2

Blood haematological and immunological parameters of turkey hens

Item	Feeding groups			SEM
	I	II	III	
Ht, %	33.6 ^a	34.9 ^b	37.0 ^a	0.87
Hb, g dl ⁻¹	11.2 ^b	12.0 ^{ab}	13.1 ^a	1.02
RBC, 10 ¹² l ⁻¹	2.26 ^b	3.04 ^b	4.22 ^a	0.21
WBC, 10 ⁹ l ⁻¹	35.0	34.2	37.4	1.53
Lymphocytes, %	46.3	45.2	47.0	1.72
Heterophils, %	49.5	50.4	48.5	1.61
Monocytes, %	2.4	2.4	2.5	0.15
Bazophils, %	0.8	0.8	0.8	0.04
Eozynophils, %	1.0	1.2	1.2	0.08
NBT- positive heterophils, %	20.9	20.1	24.3	2.21
Phagocytting heterophils, %	42.5	43.8	47.6	2.66
Phagocytic index (iF)	5.61	5.37	6.32	0.18
Lysozyme, mg l ⁻¹	1.27	1.35	1.66	0.06

SEM - standard error of the mean, ^{a,b,c} - $P \leq 0.05$

The immunological tests did not reveal any significant differences among the groups, although all examined parameters in the group receiving 5-oxo-1,2,4-triazync were higher than in the control group.

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STRESZCZENIE

Wpływ pochodnych 1,2,4-triazolu oraz 5-okso-1,2,4-triazyny na wybrane wskaźniki krwi i wyniki odchowu indyczek

Doświadczenie przeprowadzono na 6-tygodniowych indyczkach typu ciężkiego Big-6, które przez 10 tygodni otrzymywały pochodną 1,2,4-triazolu lub pochodną 5-okso-1,2,4-triazyny jako dodatek do wody pitnej. Celem podjętych badań było określenie ich wpływu na wybrane wskaźniki immunologiczne i hematologiczne krwi oraz efekty odchowu indyczek.

Uzyskane wyniki wskazują, że stosowane dodatki nie wpłynęły istotnie na odporność indyczek, jednak w grupie ptaków otrzymujących pochodną 5-okso-1,2,4-triazyny wszystkie badane wskaźniki były nieco wyższe niż w grupie kontrolnej. W grupie tej wzrosła także liczba erytrocytów oraz poziom Hb i Ht. Dodatek obydwóch badanych substancji poprawił nieznacznie wyniki odchowu indyczek.